

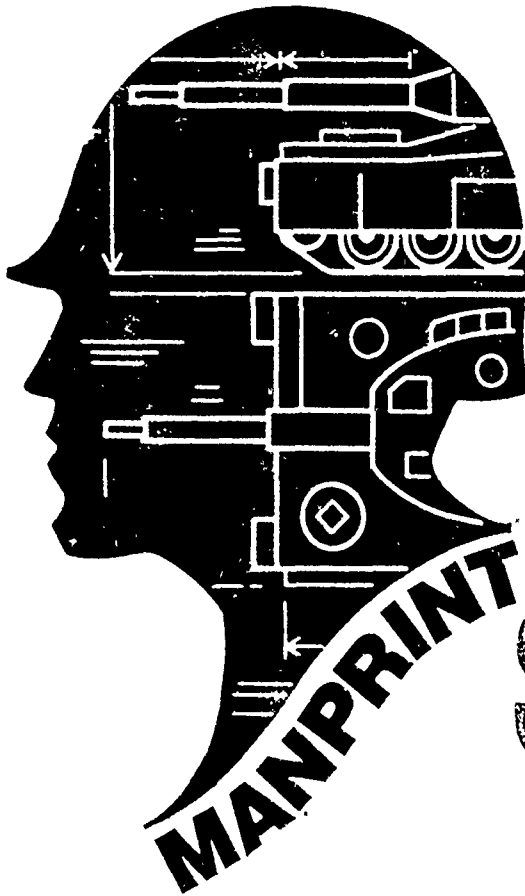
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2nd Edition (Jun 90)

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## HANDBOOK FOR RFP DEVELOPMENT

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13. ABSTRACT (Maximum 200 words) <i>Manpower and Personnel Integration</i> This revised and expanded handbook offers assistance in the preparation of the MANPRINT technical requirements for inclusion in Requests for Proposal (RFPs). The Handbook is organized into five chapters and an appendix section. Chapter 1 discusses the six domains of MANPRINT and explains how these domains and their integrated products relate to the materiel acquisition process. Chapter 2 examines each of the six domains and identifies documents and agencies that can provide assistance in RFP preparation. Chapter 3 identifies preceding events and activities that shape the structure and content of the MANPRINT requirements in the RFP. Illustrative MANPRINT paragraphs as they should appear in an RFP are provided. Chapter 4 offers an illustrative example of MANPRINT in an RFP for a notional system in the Concept Exploration phase of the LCSMM. Chapter 5 provides a similar example for a system in the Development/Proveout phase of the Army Streamlined Acquisition Process (ASAP). Those portions of the RFP with MANPRINT input are shown to demonstrate how and where MANPRINT should be incorporated and what it looks like when its six domains are integrated with one another and MANPRINT itself is fully integrated with other system requirements. Four appendices provide a list of references, a list of abbreviations and acronyms used in the handbook, a list of addresses and telephone numbers of government agencies with major responsibilities in the MANPRINT program and several MANPRINT relevant draft Data Item Descriptions.				
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June, 1990

Man-Materiel Systems  
MANPRINT HANDBOOK FOR RFP DEVELOPMENT

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## FOREWORD

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This handbook is revised throughout and a new chapter has been added. Some of the revisions are extensive, others minor. The handbook was initially published in loose leaf form to permit revision through page substitution. That approach was abandoned as impractical because of the rapid pace of change in the MANPRINT program and in the materiel acquisition process. Significant events such as the publication of Department of Defense Directive (DODD) 5000.53, Manpower, Personnel Training and Safety (MPTS) in the Defense Acquisition Process; the revision of AR 602-2, Manpower and Personnel Integration (MANPRINT) in the Materiel Acquisition Process; the introduction of Program Executive Officers (PEOs) into the material acquisition process; and the emphasis on Total Quality Management (TQM) necessitated simultaneous changes in several sections of the handbook. In addition, efforts of the Integrated Logistic System (ILS)/MANPRINT Working Group and the Joint Army/Industry MANPRINT Working Group which were going on at the same time that these revisions were being made have had impacts on the content of several sections of the handbook. Although brevity is usually viewed as a desirable virtue in any handbook, the activities mentioned above and compliance with the numerous helpful comments of users of the original edition have resulted in expanded coverage of certain topics, few deletions of material, and--inevitably--a larger book.

The material in the handbook applies to all developmental acquisition strategies whether traditional or streamlined. Two illustrative Requests for Proposal (RFP) are presented in the latter chapters of this handbook. The first, in Chapter 4, illustrates MANPRINT requirements as they might appear in a concept exploration phase RFP pursuing a traditional acquisition strategy. The second, in Chapter 5, depicts MANPRINT requirements as they might appear in a development/proveout phase RFP proceeding along a streamlined acquisition track. (MANPRINT in Nondevelopmental Item (NDI) acquisition is covered in AMC Pamphlet 602-2, MANPRINT Handbook for Nondevelopmental Item (NDI) Acquisition.)

This edition of AMC Pamphlet 602-1 also aimed to improve treatment of three topical areas which have proved troublesome to MANPRINT practitioners in the major subordinate commands of AMC. Those areas are: (1) apparent duplication and overlap with the older and much more highly-developed ILS process; (2) relationship with training development, and (3) participation in the DoD Standardization Program (authorizing the Army's MANPRINT program to have its own specifications, standards, and contract data item descriptions (DIDs)). While those three topics *are* each specifically addressed in Chapter 1, at the time this edition had to be completed there appeared to have been technical progress in only one of those three areas. Therefore, this handbook reports only the status of the MANPRINT program with respect to those three areas as of the first quarter of 1990.

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\*This pamphlet supersedes AMC Pamphlet 602-1, 23 November 1987.  
AMC-P 602-1

## Foreword

This handbook also aims to advance the understanding of MANPRINT without diminishing either the need for or importance of such other engineering specialty programs as Integrated Logistic Support (ILS) and Reliability, Availability and Maintainability (RAM). Our efforts to identify aspects of MANPRINT which were in the past the concern of individual domains such as Human Factors Engineering, System Safety or Health Hazards, should be viewed as efforts to strengthen the integration of MANPRINT rather than efforts to diminish the importance or need for those domains.

The handbook focuses on the RFP as the solicitation document of greatest complexity and, hence, the most likely to contain the most precise MANPRINT requirements. However, the material contained herein can be abbreviated, omitted, or otherwise tailored to the writer's needs in other types of procurement documents (Requests for Quotes and Purchase Orders) where MANPRINT requirements may be appropriate.

Finally, the authors wish to thank the many people who offered suggestions for revision of this document. Nearly 150 comments from numerous sources were received and studied, and approximately 75% were incorporated into this edition.

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## PREFACE

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This handbook is intended to assist personnel tasked with preparing an RFP for any phase of a major system development program. It explains how to include MANPRINT statements in the RFP.

The handbook focuses on the six interrelated domains of MANPRINT and how they are to be described in the different RFP sections. The MANPRINT domains are:

- 1) Manpower
- 2) Personnel
- 3) Training
- 4) Human Factors Engineering
- 5) System Safety
- 6) Health Hazard Assessment

This handbook is organized as follows:

CHAPTER 1 introduces the subject matter of the six domains that are currently combined and integrated into the Army MANPRINT program. The chapter explains how MANPRINT applies these domains (and their integrated products) to the *design and testing* of hardware and software to form a complete manned system. This chapter has been somewhat changed from the first edition. These changes reflect the dynamic nature of the MANPRINT program and the recent changes and additions of regulations.

CHAPTER 2 provides details on each of the six domains of MANPRINT, and identifies in each domain both documents and agencies which can provide assistance in RFP preparation. (Office file symbols, addresses and telephone numbers which are subject to more frequent changes are separated and shown in Appendix C.) The content of this chapter remains in the most part unchanged from the first edition. Some changes were made to update and improve the utility of the material.

CHAPTER 3 contains detailed guidance for preparing the MANPRINT portions of an RFP. Also included are exemplar paragraphs which interpret this guidance and show how MANPRINT requirements might appear in an RFP.

## Preface

These illustrative paragraphs are general in nature and were designed to be applicable to major and complex systems such as aircraft, combat vehicles or weapon systems. For less complex systems the paragraphs would be selectively omitted, modified, or tailored to express the MANPRINT requirements appropriate to the materiel being developed. This has been done in the RFP examples in Chapters 4 and 5. Changes in this chapter occur in the expanded manpower, personnel and human factors examples and in the reference to proposed MANPRINT DIDs.

CHAPTER 4 offers an example of an RFP for a major system in the early stages of development using the traditional acquisition strategy. The system in question, a family of combat vehicles, allows detailed consideration of MANPRINT requirements during the conceptual process when MANPRINT can have the greatest impact on system design. The MANPRINT guidance provided in Chapter 3 is applied in the Government's description of *what* it is seeking, *how it should perform*, and the *constraints that affect it*. The RFP has been edited to exclude portions that are not directly relevant to MANPRINT or its interactions. Nonetheless sufficient portions remain to provide a highly illustrative model of MANPRINT requirements and integration with other system aspects. As indicated in the Foreword, this is an entirely new chapter not previously presented in the first edition.

CHAPTER 5 contains a second RFP. In this case the system is a soldier-operated, anti-armor missile, in the development/proveout phase following a streamlined acquisition strategy. As in Chapter 4, the MANPRINT guidance from Chapter 3 is selectively applied to illustrate the manner in which MANPRINT requirements are organized and called for within the context of a "real world" RFP. The MANPRINT portions of Chapter 5 have been extensively changed to reflect the new material presented in Chapters 1 and 3. Chapters 3, 4 and 5 are the heart of this handbook and should be consulted in the preparation of each RFP.

APPENDIX A is a list of references used in the preparation of this handbook which the reader can consult for more detail in particular areas.

APPENDIX B is a list of abbreviations and acronyms used in this handbook.

APPENDIX C contains addresses and phone numbers (current to January, 1990) of those government agencies involved in the MANPRINT program from whom consultation and assistance in the preparation of an RFP can reasonably be expected.

APPENDIX D contains examples of Data Item Description's (DIDs) that cover MANPRINT-relevant areas for which no authorized DIDs exist. These items are referred to in various sections of the handbook. This is a new appendix not presented in the earlier version.

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## INTRODUCTION

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### 1.1 Purpose

The purpose of this handbook is to facilitate the preparation of MANPRINT technical requirements for RFPs for materiel acquisition using the developmental approach. The handbook provides illustrative examples of MANPRINT requirements intended to assist the writer in preparing MANPRINT statements to fit a specific system in a specific acquisition phase.

### 1.2 What is MANPRINT?

The Department of the Army describes Manpower and Personnel Integration (MANPRINT) as a comprehensive management and technical effort to ensure the battlefield effectiveness of manned systems by continuous integration into materiel development and acquisition of all relevant information concerning Manpower, Personnel, Training, Human Factors Engineering, System Safety, and Health Hazards. In the materiel acquisition program this effort entails an intensive front-end analysis effort to identify and state in requirements documents realistic MANPRINT goals and constraints which will carry over into contractual design requirements. As an acquisition proceeds, industry is expected to demonstrate (by data and analyses) that its design meets the MANPRINT requirements identified for that particular system. The Army will not permit MANPRINT goals and constraints to be altered without knowing the consequences and assessing the Army's ability to adapt. Army decision makers will expect clear and convincing evidence from industry and from Army test and evaluation agencies that the soldier performance which is necessary to achieve system mission effectiveness is both achievable and affordable.

### 1.3 MANPRINT Initiative

Although MANPRINT is a relatively recent Army initiative, interest in the concept began in the early 1980s as the result of a series of Army studies. These studies focused on advances in high-technology weapons systems coupled with knowledge acquired from experiences in world-wide contemporary

conflicts. These reports concluded that, while our units might possess the most sophisticated and theoretically superior equipment, total performance might not be realized unless human performance was also taken into account. This awareness marked the beginning of coordinated initiatives to improve the integration of the characteristics of the individual soldier with the design of modern weapon systems. These initiatives also coincided with Congressional concerns that the Armed Forces get what they pay for in total weapons systems performance and that critical resources not be wasted by acquiring high-technology equipment whose operation and maintenance requirements exceed the capabilities of soldiers. In the past, increased capability achieved with advanced technology was often accompanied by increases in the complexity of soldiers' tasks. Materiel design was not always guided by a disciplined process that insisted on keeping "the soldier in the loop." Moreover, the design process was often built on the unstated assumption that sufficient numbers of skilled soldiers would always be available to operate, maintain, and support the advanced hardware. Today, the urgent need to resolve problems arising from the rapidly increasing complexity of military hardware (with its attendant need for trained, high-skill soldiers), the anticipated finite limits on the number and quality of soldiers available in the 1990s and beyond, and smaller Defense budgets in the foreseeable future, have moved MANPRINT into the forefront of materiel acquisition planning.

#### 1.4 MANPRINT Integration

The key words in the MANPRINT process are "Integration" and "...throughout materiel development and acquisition...". The six discrete technologies whose component aspects comprise the domains of the MANPRINT program have been traditionally recognized and independently tested for years. New Equipment Training (NET), development of new institutional training programs, Basis of Issue Plans (BOIP), Qualitative and Quantitative Personnel Requirements Information (QQPRI), Manpower Requirement Criteria (MARC), and Military Occupational Specialty (MOS) determination have long had their place in the fielding of newly developed Army equipment. What then does MANPRINT integrate, and why the need?

First, within the materiel acquisition process, the MANPRINT program attempts to integrate the activities and products of the six existing domains of Manpower, Personnel, and Training (MPT), Human Factors Engineering (HFE), System Safety (SS), and Health Hazard Assessment (HHA). The trend in each of these domains in the last decade has been to link measurements within the domain to system effectiveness. As an over-arching concept, MANPRINT not only enhances integration among its domains but has the broader objective of integrating these domains with relevant design activities in traditional areas of maintenance, logistics, and support. In so doing, the MANPRINT process focuses concern not only on the individual soldier but also on the units which will employ, maintain, and support new materiel (Figure 1).



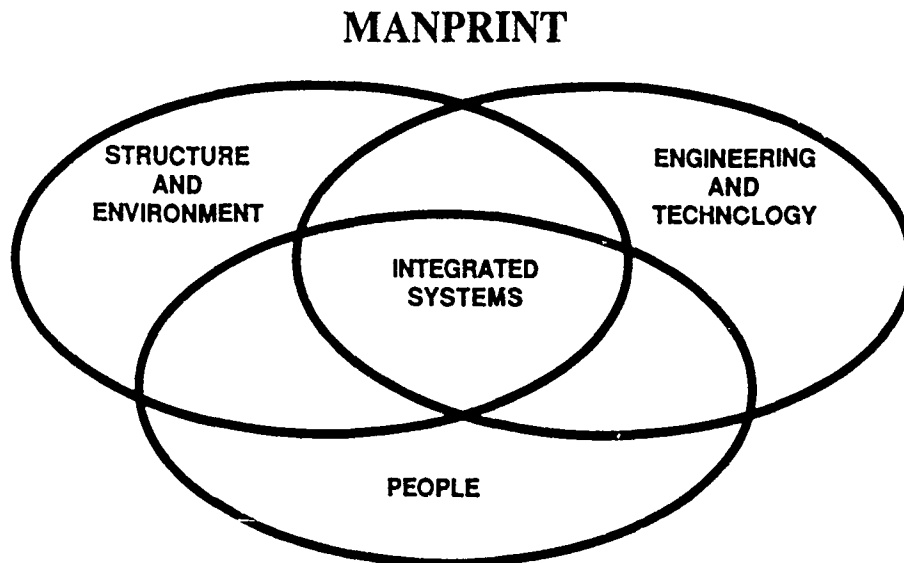


Figure 1. MANPRINT Process Produces Integrated Systems

The second element in the MANPRINT program is the insistence that technical information from the MANPRINT domains should play a prominent role in guiding the decisions which determine the design characteristics of new materiel from the concept formulation phase through the deployment phase. As an example, new system manpower demands and skill level demands must be managed like other major design parameters, beginning with the earliest conceptions of the new systems. MANPRINT issues can all be associated with dollar costs (both in terms of research and development and of operations and maintenance). Early on, these costs are identifiable and containable. It is therefore cost effective for the Army to pay the contractor to consider these matters during initial stages of hardware design. Thus, the answer to the question, "Why the need?," is that MANPRINT contributes to total system effectiveness by influencing system design up front, thereby making those systems at once more effective, more supportable and more affordable.

### 1.5 MANPRINT and Integrated Logistic System (ILS) Coordination

In perhaps no other technological area has the Army's MANPRINT program been faced with so many challenges to its very existence as in attempting to interface with ILS--both as an independent discipline and as co-contributor to a specific development project. For a start, three of MANPRINT's six domains (manpower, personnel and training) are also "elements" of Integrated Logistic Support. That is, the words are the same. This sameness of terminology has led many people to the erroneous assumption that--at least with respect to those

three topics--there are duplications or overlaps between the MANPRINT and ILS programs. In reality, though the *words* may be the same, the *concerns* are not (Figure 2).

<u>USER</u>	<u>PERSPECTIVES</u>	
	MANPRINT	ILS
COMBAT DEVELOPER	BATTLEFIELD EFFECTIVENESS	SYSTEM SUPPORT
MATERIEL DEVELOPER	SYSTEM ENGINEERING	LOGISTICS
TRAINING DEVELOPER	SOLDIER APTITUDE- TRAINING RESOURCES TRADEOFF	NEW EQUIPMENT TRAINING  MAINTENANCE SKILL LEVEL DETERMINATION  TRAINING DEVICES
TESTER EVALUATOR	SYSTEM EFFECTIVENESS (E) ACHIEVED AVAILABILITY ( $A_A$ ) MANPRINT AVAILABILITY ( $A_M$ )	OPERATIONAL AVAILABILITY ( $A_O$ )

Figure 2. MANPRINT and ILS Perspectives.

A second factor causing confusion at the working level has been the tendency to assign the task of "MANPRINT Manager" to the same person who is also the "ILS Manager." While there are a few instances in which this practice has been successful, it has more often resulted in the eclipse or elimination of MANPRINT programs within actual development projects. One AMC command shifted the MANPRINT responsibility to its system engineering organization, with more satisfactory results.

On-going efforts seek to eliminate the apparent duplication of terminology between the two programs and to develop arrangements to share data across programs within the same project. Included are programs of automated aids to RFP preparation such as Logistic Planning and Requirements Simplification System (LOGPARS) which deals primarily in the ILS domain but touches upon the six domains of MANPRINT as well, and Smart Contract Preparation Expediter (SCOPE) which assists generating the HFE portion of the SOW. While signs of assistance in the complex business of RFP writing are developing, no single system is bias-free. At this stage of development,

assistance from a variety of domain subject matter experts, use of established documentation such as military standards and specifications, as well as automated aids, appear to be the best methods of getting the job done.

This handbook is limited to the treatment of MANPRINT, but does attempt to facilitate the necessary interaction of MANPRINT with ILS and Logistic Support Analysis (LSA) through frequent reminders of areas of mutual interest and through the inclusion of ILS and LSA references.

## 1.6 Streamlined Acquisition

Traditionally, the development of new equipment took 11 to 15 years from conception to deployment; often sufficient time for a system to become technologically obsolete before it was fielded. The Army Streamlined Acquisition Process (ASAP) accelerates fielding by adopting a simpler, more flexible approach to materiel acquisition without sacrificing quality (Figure 3).

While presented here in some detail, the ASAP is only one method of streamlining the acquisition process. The particular process used is often tailored to the system and the stage of development.

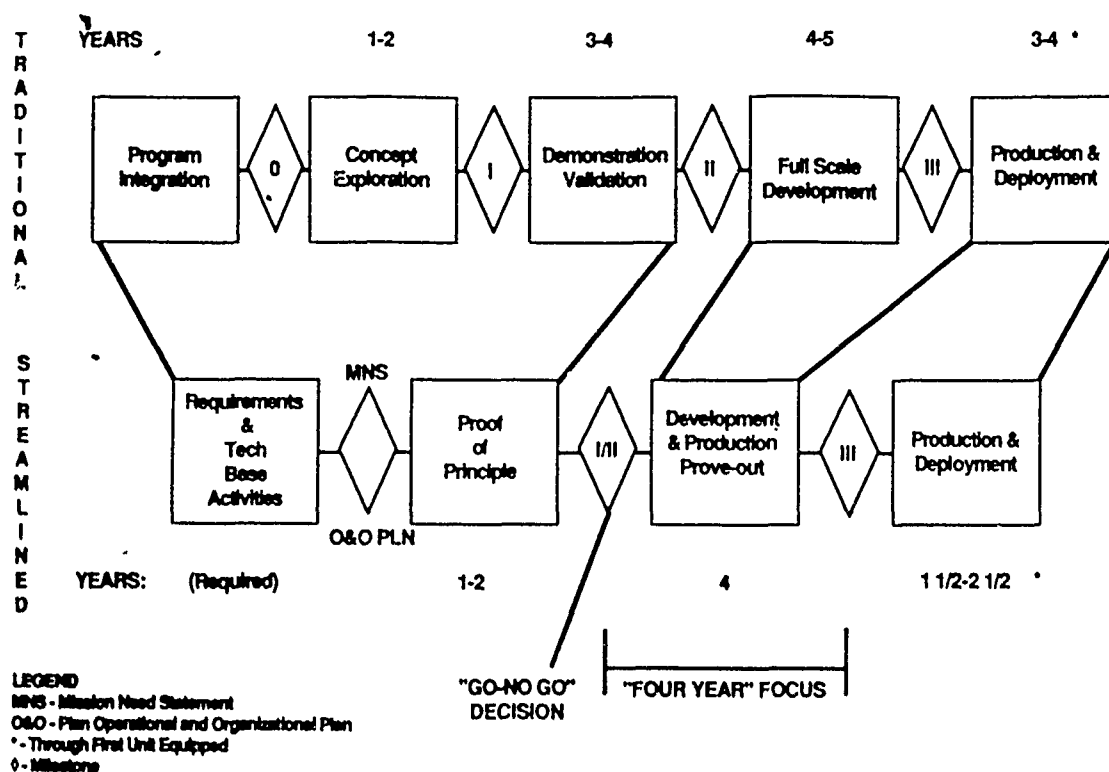


Figure 3. Acquisition Process Comparison

Key features of ASAP include:

- a. Structuring requirements for pursuit of companion "now" and "later" capabilities which foster low risk development for the near term with a potential for growth under Preplanned Product Improvement (P<sup>2</sup>I) programs.
- b. Early focus of technology on mission area needs and maturation of technology at component level.
- c. Combining user experimentation and troop demonstrations to prove out both the technical approach and operational concept before proceeding to full scale development.
- d. Proof of performance via hand-tooled prototypes whenever possible prior to entry into Production-Deployment phase.
- e. Integration of testing (technical testing (TT) and unit testing (UT)) and wider sharing of test data, via a common data base and continuous evaluation throughout the life cycle.
- f. Minor reorientation of formal milestones.

Thus, although the traditional acquisition process will continue to be used, especially in the more complex acquisitions involving state-of-the-art technology and greater risks, the use of ASAP and other tailored or streamlined acquisition processes are expected to increase in the foreseeable future. The latter Chapters of this handbook offer examples of RFPs developed for different stages of the acquisition process primarily to illustrate the differences in the manner MANPRINT requirements are cited at different stages of the acquisition process. A secondary purpose is to acknowledge that both the traditional and the streamlined acquisition methods are concurrently in use. Thus, Chapter 4 illustrates a traditional acquisition process, while Chapter 5 illustrates a streamlined acquisition process.

## 1.7 MANPRINT at the RFP Stage

The principal means by which the Army formally communicates its materiel requirements to industry is the RFP. The process of preparing an RFP is led by the Army materiel developer with the support and assistance of the combat developer and specialists from other agencies. In communicating its requirements to industry, the Army must clearly state what it is that it wishes to procure. The procedures by which this is accomplished are well established under a body of laws, regulations and policies that govern materiel acquisition. What is required for implementation of an initiative such as MANPRINT is to take the technological requirements arising from an operational need and

convert them into relevant acquisition language which is understood and can be responded to by industry. U.S. Army Training and Doctrine Command (TRADOC) documents, such as the Operational and Organizational (O&O) Plan and Required Operational Capability (ROC) delineate those requirements to the materiel developer. MANPRINT along with other requirements are "refined" into contractual language and the result is a solicitation document such as the RFP. In short, the RFP portends a contract and describes the product and services that the Government wishes to procure. For convenience we have called this period of transition from requirements document to RFP the "Definition" process (Figure 4).

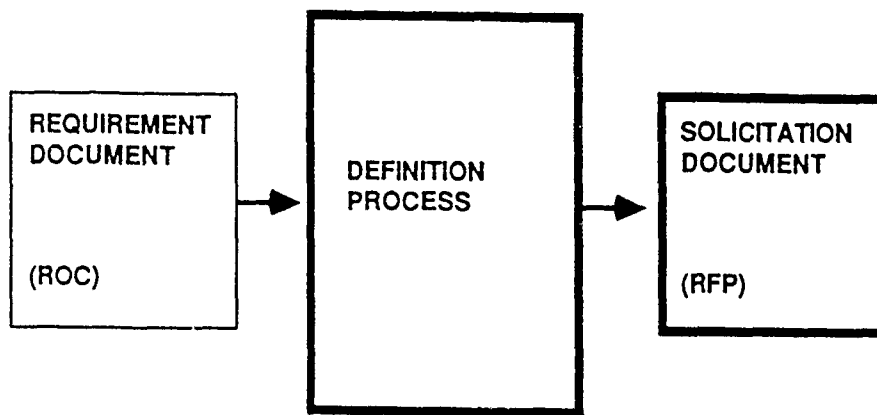


Figure 4. The Definition Process

It is also important to recognize that, during the life cycle of a single materiel item, RFPs may be written in each of several stages. For instance, requirements processing through the proof of principle, development/prove out, and production and deployment phases may each go through a definition process and emerge in an RFP. There are some qualitative differences in the way MANPRINT affects the RFP in each of those phases. Generally, if MANPRINT is to contribute to effective system design, its influence must be felt during the earliest acquisition phase. Some key design questions (for instance, the choice of crew size and, hence, the basic architecture of a vehicle) are usually decided early, and should normally not be made without consideration of MANPRINT data.

## 1.8 Industry Involvement in MANPRINT

Army policy now invites the participation of industry in the review of materiel requirements documents (MRD) during the staffing of a first draft document. The U.S. Army Materiel Command (AMC) Technical Industrial Liaison Office (TILO) is responsible for coordinating the release of all draft and approved MRD through appropriate Major Subordinate Command TILOs (MSC TILO) to members of industry. The Commerce Business Daily (CBD) is the medium used to announce the availability of draft MRD for review and comment by interested members of industry. Industry requests must be sent directly to the MSC TILO within seven days from the date of the CBD published announcement. Copies of draft requirement documents such as the O&O Plan, Mission Need Statement (MNS), Joint Service Operational Requirement (JSOR) and ROC are circulated to potential contractors for periods of between 30 to 60 days for review. The intent is to improve communications with industry concerning the Army's materiel requirements including MANPRINT with respect to a specific acquisition program and to provide the Army feedback concerning industry's abilities to meet such requirements. Industry comments are incorporated into the MRD where appropriate, while guarding against industry input that would otherwise defeat a truly competitive situation.

## 1.9 MANPRINT and Total Quality Management (TQM)

One of the central ideas in the TQM Program is to keep continually in mind the requirements of the user. Since one of the goals of the MANPRINT Program is to *consider the soldier* who will be the user and maintainer of the equipment to be produced, there is a natural link-up between these two programs. Both programs promote acquisition strategies that seek continuous improvement of quality and reduced ownership costs. Both programs are aimed at increasing "customer satisfaction" through improved performance and reduced development cycle time. MANPRINT especially emphasizes the concurrent engineering approach to the total system. The MANPRINT philosophy, while focusing on the soldier related aspects of system development, is primarily a philosophy of integrating all aspects of the total system. The MANPRINT challenge is to "do it right the first time" by practicing system engineering of the *total* system including the soldier and the using military unit in the field. With TQM, MANPRINT shares the goals of improving quality, efficiency, and effectiveness not only of the fielded weapon or system but of maintenance, supply and support activities as well. An effective MANPRINT program within a specific system acquisition program is clearly consistent with TQM objectives (Reference 126).

## 1.10 MANPRINT in the DoD Standardization Program

In most cases the U.S. Armed Forces acquire their equipment from private industry. The process of that acquisition is governed by a myriad of laws, regulations, and policies (most of which are familiar to RFP writers). At present, each of the services is authorized to do its own procurement. However, because the same *products* are often sought by different services (with their own regulations and policies) from the same source, a program (administered within the Office of the Secretary of Defense (OSD)) was developed to make the *technical* language of the various procurement documents more uniform and intelligible.

The DoD Standardization Program has three principal parts about which an RFP writer must be informed. They are:

- Standards: Used to describe desired *behavior* of a contractor, these documents say what work needs to be done by the contractor's employees in connection with the design, development and testing of the system being acquired.
- Specifications: Used to describe essential *characteristics* of the equipment produced by the contractor, these documents express in objectively verifiable terms (like height, weight and color) features of the contractor's product which must be present.
- Data Item Descriptions (DIDs): Used to describe *content and format* requirements of reports (and other documents) to be prepared by the contractor and delivered to the government.

What all of those three principal parts of the DoD Standardization Program have in common is that each has a parent *area*. Currently there are 33 such areas, ranging from "Automatic Test Technology Standards (ATTS) to "Technical Manual Specifications and Standards" (TMSS). Each such area has a standing committee (usually composed of subject matter experts from all three services) responsible for keeping current the specifications, standards and DIDs related to that particular technology.

Of the six MANPRINT "domains," four have their own standardization areas (see Figure 5). However, these four operate independently, and there currently is no provision for either the integration or interaction of these domains.

MANPRINT DOMAIN	MILITARY STANDARD	MILITARY SPECIFICATION	DATA ITEM DESCRIPTION
MANPOWER	NO	NO	NO*
PERSONNEL	NO	NO	NO*
TRAINING	YES	YES	YES
HUMAN FACTORS ENGR	YES	YES	YES
HEALTH HAZARDS	YES	YES	YES
SYSTEM SAFETY	YES	YES	YES

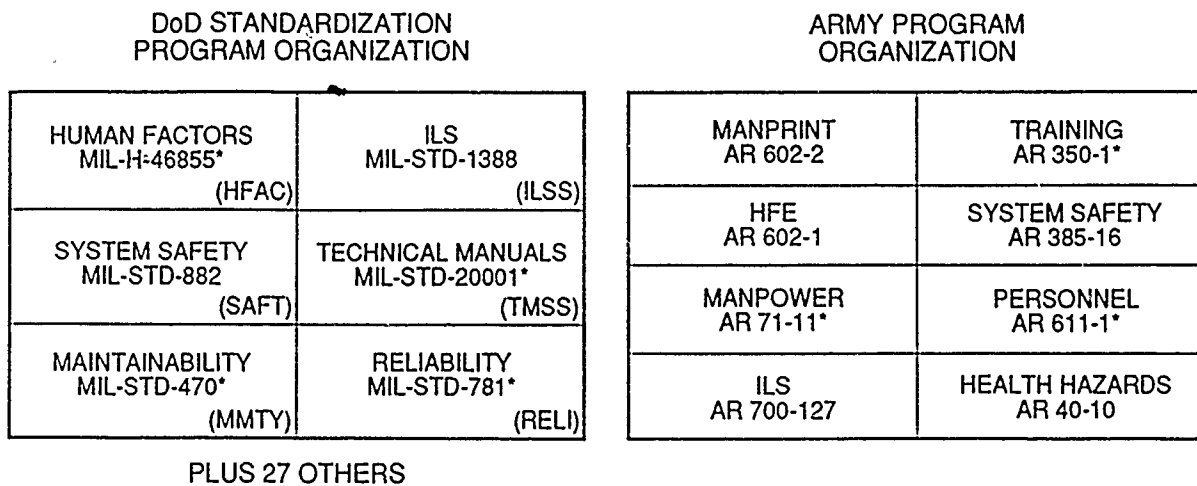
\*CERTAIN ILSS DID<sub>s</sub> DEAL WITH THE SUPPORTABILITY ASPECTS OF MANPOWER AND PERSONNEL

Figure 5. Standardization and the Six MANPRINT Domains.

Unfortunately for MANPRINT, there is a structural problem (see Figure 6) in relating the objectives set forth in AR 602-2 to the standardization areas described in the Standardization Directory (SD-1). Despite the existence of DoD Directive 5000.53 (concerning MPTS in system acquisition), there is as yet no area in the DoD Standardization Program which can promulgate MANPRINT specifications, standards, or DID<sub>s</sub>. Among the complaints expressed by industry representatives in recent MANPRINT Industry Conferences was the lack of MANPRINT DID<sub>s</sub>. While several such DID<sub>s</sub> have been proposed (see Appendix D), none has yet been approved. And, while a MANPRINT military standard has been drafted, none of the 33 existing areas in the DoD Standardization program is chartered to promulgate it. (There are two existing areas, Human Factors (HFAC) and Integrated Logistics Support Standards (ILSS) which have been considered. However, HFAC is currently limited to human engineering considerations, and ILSS deals only with supportability, not operability.)

At this writing, MANPRINT practitioners are effectively excluded from participation in the DoD Standardization Program, and need to write their requirements directly into the contract statement of work (SOW) and the system specification. Requirements for data from the contractors can also be stated in one-time DID<sub>s</sub> or piggy-backed onto general DID<sub>s</sub>, such as DI-MISC-80711, "Scientific and Technical Reports."





\* Only Principal Reference Cited

Figure 6. The Structural Problem of MANPRINT and the DoD Standardization Program

### 1.11 MANPRINT Rules of Thumb

To close this introductory chapter, five postulates or MANPRINT "rules of thumb" (originally printed in the **MANPRINT Bulletin** of January-February 1989 (pg. 8)) are offered to guide the RFF writer in developing the MANPRINT portion of any RFP. While adherence to these rules of thumb does not alone guarantee the success of a MANPRINT program, violation of any of them invites deficiencies in the ultimate effectiveness and availability of the fielded system.

The five MANPRINT rules of thumb are:

- (1) Soldier Performance Affects System Performance;
- (2) Skill is a Function of Aptitude and Training;
- (3) Measure Soldier Performance by Time and Accuracy;
- (4) Equipment Design Determines Soldier Tasks; and
- (5) Make the Designer Responsible for Soldier Performance.

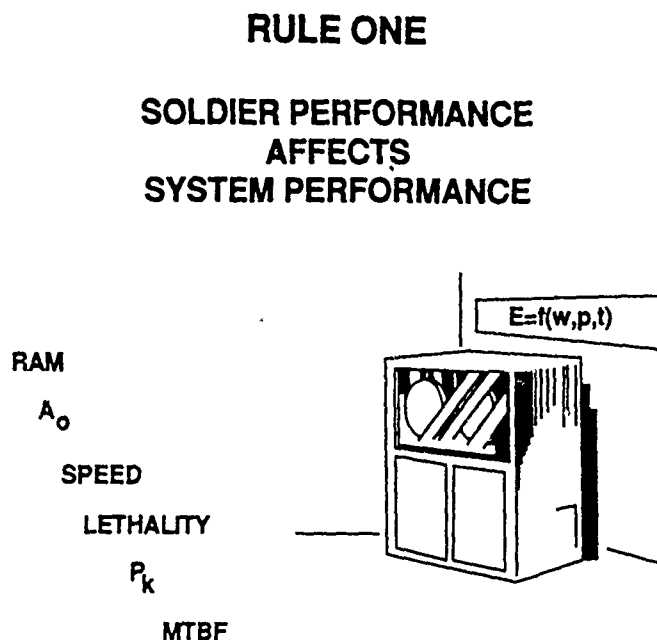


Figure 7. MANPRINT Rule of Thumb #1

It is evident that both soldier and machine must complement each other if overall manned system performance is to be successful. A lack of fit between the machine and the soldier can create a "performance gap". A *performance gap is the inability of the manned system to achieve the system performance potential forecasted for the hardware and software alone.* Technological advances have brought about the advent of superweapons; however, the capabilities of the soldiers who are to operate, maintain, and support such systems have not changed much over time. The Army has a fixed pool of soldiers at its disposal with finite cognitive and psychomotor characteristics. The soldier, therefore, can become the limiting factor in system effectiveness. An important purpose of the MANPRINT requirements in the RFP is to influence materiel design so that technology, and not the soldier, becomes the limiting factor in achieving the desired battlefield effectiveness.

As expressed here, "skill" is the product of the interaction of aptitude and training. Aptitude consists of basic abilities inherent in the individual soldier and not readily modified by training. Therefore, the traits which make up the quality called aptitude, are considered *stable* over time. The Army uses Armed Services Vocational Aptitude Battery (ASVAB) scores as measures of aptitude.

## RULE TWO

### APTITUDE + TRAINING = SKILL

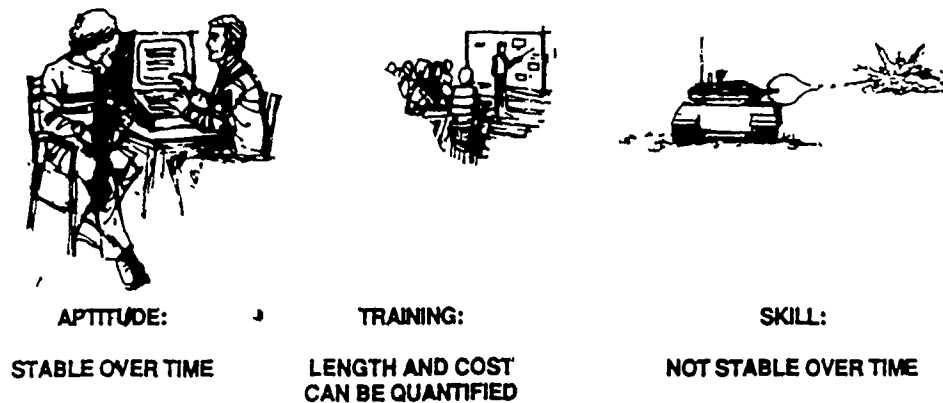


Figure 8. MANPRINT Rule of Thumb #2

Training refers to a series of activities (e.g., verbal instructions, on-the-job practice) which enable soldiers to acquire skill in the tasks they must perform to accomplish Army missions. Training is most effectively evaluated on two dimensions: (1) completeness (i.e., covered everything the soldier needed to know) and (2) sufficiency (i.e., enough instruction and practice for the soldier to achieve the acceptable standard of performance).

Within the Army, the term "skill" has at least two meanings: one is the soldier's specialization within an MOS, the other is the more common use of the term to mean a high level of proficiency. When "skill" is used in the sense of "proficiency," it becomes dependent upon: (a) the time to acquire mastery of critical tasks initially, (b) the time elapsed since tasks were last trained, and (c) the methods of training used. As a result, skill is considered *unstable over time*, due to proficiency decay as a function of time without practice. In this sense proficiency of soldiers with known aptitudes and training can be measured at a specific time and place and those time and accuracy scores used to predict the level of performance which other soldiers with known aptitudes, training and practice can be expected to achieve.

### **RULE THREE**

## **MEASURE SOLDIER PERFORMANCE BY TIME AND ACCURACY**



Figure 9. MANPRINT Rule of Thumb #3

This MANPRINT rule of thumb refers to the "common sense" notion that human performance occurs simultaneously in two dimensions: time and accuracy. Measuring one without the other (or measuring them both, but independently) invariably produces a distorted picture of reality. This rule of thumb is a vital consideration in developing any data collection plan. System design defects which might have been disclosed early can be "masked" if, for example, the performance data describe only the "time" it takes for a soldier to perform a particular task. Such defective data have been used in the past to argue that "any soldier" (regardless of aptitude or training) could accomplish a particular task within that amount of time. TRADOC schools have begun stating soldier performance standards in terms of *both* time and accuracy, and such statements in requirements documents should be faithfully translated into procurement and testing documents.

## **RULE FOUR EQUIPMENT DESIGN DETERMINES SOLDIER TASKS**



Figure 10. MANPRINT Rule of Thumb #4

The essence of this rule of thumb is that the equipment designer has the power both to create and to eliminate soldier performance tasks. A "system" to perform a particular mission may, therefore, involve very simple equipment and software attended by numerous and highly-skilled operators, or highly automated equipment with few operators of much less skill. It is essential that tasks assigned by the designer to the soldier be within the soldiers' capabilities to perform. The whole purpose of providing industry with the "Target Audience Description" is to ensure that the designers are made aware early of the capabilities and limitations of the soldiers whom the Army plans to assign to the system whatever the system operations and maintenance tasks the designer creates.

**RULE FIVE**  
**MAKE THE DESIGNER**  
**RESPONSIBLE FOR**  
**SOLDIER PERFORMANCE.**

HEY! WAIT A MINUTE! ALL I  
DO IS DESIGN EQUIPMENT!  
IT'S YOUR JOB TO MAKE IT  
WORK IN THE FIELD.



Figure 11. MANPRINT Rule Thumb #5

Arguably, the first four MANPRINT "rules of thumb" simply restate in a concise way what is already within the common knowledge of Army equipment designers. In that respect, "Rule 5" is somewhat different, and represents a conscious decision by Army management to shift to the contractor major responsibility for the *field performance* of the hardware and software he designs. Such a shift in responsibility, while new from the Army's perspective, is entirely consistent with the provisions of Circular A-109 issued by the Executive Office of the President of the United States more than a decade ago.

The reasoning behind this decision to shift responsibility for field performance to the contractor is that, as noted in Rule #4 above, it is the contractor's designer who in effect determines the *soldier* performance requirements for operations and maintenance in any system. Since the designer has that power, he now has the responsibility to exercise that power in a way that is consistent with capabilities and limitations of the Army's personnel.

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## GETTING ORGANIZED FOR MANPRINT

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### 2.1 MANPRINT Domains

In this chapter each of the six domains of MANPRINT, Manpower, Personnel, Training, Human Factors Engineering, System Safety, and Health Hazard Assessment, will be discussed in the following sequence:

- *Definition*--What is this domain all about?
- *Sources of Assistance*--Who can help?
- *References*--What guidance is available?

From this chapter, those concerned with preparing MANPRINT requirements in the RFP should obtain an understanding of each domain and the sources which may offer assistance in the event that help is needed. Please note that both the References and the Sources of Assistance in the figures of this chapter are abbreviated to facilitate a quick grasp of the domain in question. More expanded lists are provided at Appendices A and C respectively.

### 2.2 Manpower

- 2.2.1 **Definition.** Manpower refers to the human resource requirements and authorizations (military and civilian spaces) needed for the operation, maintenance, and support of each item of hardware. It requires an evaluation of the Army manpower changes generated by each proposed new system, comparing the new manpower needs with those of any old system(s) being replaced, and an assessment of the impact of the changes on the total manpower limits of the Army. If, given manpower priorities established by Headquarters, Department of the Army (HQDA), systems cannot be supported by projected manpower resources, then changes in system design, organization, or doctrine must be made to achieve affordability. In the materiel acquisition process, manpower analyses and actions are necessarily conducted in conjunction with force structure and budget processes.

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- 2.2.2 **Sources of Assistance.** Agencies and the type of assistance they can provide in the Manpower domain are listed in Figure 12. Specific points of contact are listed in Appendix C.

Source	Type Assistance
TRADOC	Basis of Issue Plan/Qualitative and Quantitative Personnel Requirements Information (BOIP/QQPRI) Target Audience Description (TAD) MANPRINT Assessment
TRADOC Proponent School MANPRINT Joint Working Group (MJWG)	System MANPRINT Management Plan (SMMP) Operation and Organizational Plan (O&O Plan) Mission Need Statement (MNS) ROC
U.S. Army Materiel Command (AMC)	Basis of Issue Plan Feeder Data/Qualitative and Quantitative Personnel Requirements Information (BOIPFD/QQPRI)
U.S. Total Army Personnel Command (PERSCOM)	Manpower Issues
U.S. Army Personnel Integration Command (USAPIC)	MPT Methodologies Hardware versus Manpower Methodology (HARDMAN) System MANPRINT MANAGEMENT Plan (SMMP) Guidance Early Comparability Analysis (ECA)
Deputy Chief of Staff for Operations and Plans, Headquarters, Department of the Army (DCSOPS, HQDA)	Force Structure
Deputy Chief of Staff for Personnel, Headquarters, Department of the Army (DCSPER, HQDA)	MANPRINT Policy MANPRINT Assessment Army Systems Acquisition Review Council (ASARC) Manpower Issues

Figure 12. Manpower Sources of Assistance



2.2.3 **References.** Sample Manpower references are listed in Figure 13. See Appendix A for additional references.

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AR 570-1	Manpower and Equipment Control-Commissioned Officer Position Criteria
AR 570-2	Manpower and Equipment Control-Manpower Requirement Criteria (MARC) Table of Organization and Equipment (TOE)
AR 570-5	Manpower Staffing, Standards System
AR 602-2	Manpower and Personnel Integration (MANPRINT) in the Materiel Acquisition Process
AR 611-101	Commissioned Officer Specialty Classification System
AR 611-112	Manual of Warrant Officer Military Occupational Specialties
AR 611-201	Enlisted Career Management Fields and Military Occupational Specialties
AR 700-127	Integrated Logistic Support

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Figure 13. Sample Manpower References

## 2.3 Personnel

2.3.1 **Definition.** Personnel refers to the military and civilian persons of the aptitude, skill level, experience, and other human physical and mental characteristics needed to operate, maintain and support Army equipment. It requires detailed assessment of the aptitudes which soldiers must possess in order to complete training and successfully use, operate and/or maintain the materiel. Iterative analyses must be accomplished as integral components of the new system design process, comparing projected quantities of qualified personnel with requirements of the new system, any system(s) being replaced, overall Army needs for similarly qualified people, and priorities established by the Department of the Army. As necessary, the system is configured specifically to accommodate the probable capabilities of personnel projected to be available, so that the new system is supportable from a personnel standpoint. Analysis of specific system personnel requirements is necessary for each system design option considered, using "best available" information early in the acquisition process and improved information as the system design becomes firmer. Personnel analyses must consider not only simple availability, but also the capability of the Army personnel management system to provide the needed numbers of properly qualified people at a reasonable cost. Personnel must be included in system life cycle cost estimates and system design tradeoffs, i.e., machine costs versus personnel costs. Personnel analyses and projections are

## Chapter 2 - Getting Organized for MANPRINT

needed in time to allow orderly recruitment, training and assignment of personnel in conjunction with equipment fielding.

- 2.3.2 **Sources of Assistance.** Agencies and the type of assistance they can provide in the Personnel domain are listed in Figure 14. Specific points of contact are listed in Appendix C.

Sources	Type Assistance
AMC	BOIPFD/QQPRI LSA Input
U.S. Army Research Institute (ARI)	MPT Measurement and Assessment
DCSPER, HQDA	MANPRINT Policy MANPRINT Assessment
PERSCOM	Personnel Data
USAPIC	MPT Methodology HARDMAN Methodology ECA SMMP TAD
TRADOC	BOIP/QQPRI TAD MANPRINT Assessment
TRADOC Proponent School MJWG	SMMP O&O Plan MNS ROC Personnel Issues and Criteria LSA Input

Figure 14. Personnel Sources of Assistance

- 2.3.3 **References.** Sample Personnel references are listed in Figure 15. See Appendix A for additional references.

AR 70-8	Personnel Performance and Training Program (PPTP)
AR 71-2	Basis of Issue Plans (BOIP), Qualitative and Quantitative Personnel Requirements Information (QQPRI)

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AR 602-2	Manpower and Personnel Integration (MANPRINT) in the Materiel Acquisition Process
AR 611-101	Commissioned Officer Specialty Classification System
AR 611-112	Manual of Warrant Officer Military Occupational Specialties
AR 611-201	Enlisted Career Management Fields and Military Occupational Specialties
AR 680-29	Military Personnel, Organization and Types of Transaction Codes
AR 700-127	Integrated Logistics Support
MIL-STD-1388-1A	Logistic Support Analysis
MIL-STD-1388-2A	Logistic Support Analysis Record
RP-88-15	<i>Handbook for Quantitative Analysis of MANPRINT Considerations in Army Systems.</i> U.S. Army Research Institute

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Figure 15. Sample Personnel References

## 2.4 Training

- 2.4.1 **Definition.** Training consists of the instruction, time and other resources necessary to impart the requisite knowledge, skills, and abilities to qualify Army personnel for operation, maintenance, and support of Army equipment. Training is conducted at the institution (i.e., TRADOC schools), and in the unit. It involves (1) the formulation and selection of engineering design alternatives which are supportable from a training perspective, (2) the documentation of training strategies, and (3) the timely determination of resource requirements to enable the Army training system to support system fielding. Formulating the training of a new system requires analyses that take into account the expected soldier aptitude levels, the soldier's previous training, the nature and complexity of knowledge and skills to be acquired, and the proficiency levels to be attained and sustained. Identifying and, where possible, minimizing the requirements in these areas should be an important consideration in selecting engineering design alternatives. The training package for a new system should include a documented training program for individuals and units (including training materials, any provision for embedded training, and training devices, if appropriate); the process of transmitting the new knowledge to the Army (through factory training, NET, training of test personnel, and the evaluation of the new training itself); and the timely identification of resource requirements to enable the Army training establishment to support system fielding.

- 2.4.2 **Sources of Assistance.** Agencies and the type of assistance they can provide in the Training domain are listed in Figure 16. Specific points of contact are listed in Appendix C.

Sources	Type Assistance
AMC	New Equipment Training Plan (NETP) Training Utility Evaluation LSA Input
DCSPER, HQDA	MANPRINT Policy MANPRINT Assessment
Project Manager for Training Devices (PM TRADE)	Training Devices
USAPIC	MPT Methodologies HARDMAN Methodology ECA SMMP TAD
TRADOC	Training Constraints Training Issues and Criteria BOIP/QQPRI Army Training Evaluation Program (ARTEP) Skill Qualification Test (SQT) Scores System Training Plan (STRAP) LSA Input
TRADOC Proponent School	SMMP
MJWG	O&O Plan MNS ROC

Figure 16. Training Sources of Assistance

- 2.4.3 **References.** Sample Training references are listed in Figure 17. See Appendix A for additional references .

AR 350-35	Army Modernization Training
AR 350-38	Training Device Policies and Management

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AR 602-2	Manpower and Personnel Integration (MANPRINT) in the Materiel Acquisition Process
TRADOC Reg 350-7	A Systems Approach to Training
TRADOC Reg 350-17	Initial Entry Training Fill Policy and Procedures
TRADOC PAM 350-30	Interservice Procedures for Instructional Development
TRADOC Reg 351-1	Training Requirements Analysis System
MIL-STD-1379B	Contract Training Programs
MIL-STD-1379C	Military Training Programs
MIL-T-23991	Training Devices, Military, General Specification for

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Figure 17. Sample Training References

**2.5 Human Factors Engineering (HFE) [Used interchangeably with Human Engineering in this handbook.]**

**2.5.1 Definition.** Human Factors Engineering deals with the design of Army materiel to ensure that its use conforms to the capabilities and limitations of the fully equipped range of soldiers that operate, maintain, supply, and transport the materiel in the operational environment. It is used in system definition, design, development, and evaluation in order to optimize the capabilities and performance of soldier-machine systems. It includes those aspects of systems analysis that determine the role of the soldier in the system, defining and developing soldier-materiel interface characteristics, workplace layout, and work environment. HFE provides soldier-materiel task sequence data used to describe, develop, and assess the feasibility of human performance required in a soldier-machine system application and involves considerations of all relevant information pertaining to the following:

- Human physical and psychological characteristics
- Anthropometric data
- System interface requirements
- Human performance
- Biomedical factors
- Safety factors

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In addition, human factors engineering analyses pertaining to the following are used as inputs to the consideration of Manpower, Personnel, and Training issues in the MAP.

- System manning levels
- User, operator, and maintainer capability requirements

The adequacy of system HFE is evaluated during both technical and operational testing.

2.5.2 Sources of Assistance. Agencies and the type of assistance they can provide in the Human Factors Engineering domain are listed in Figure 18. Specific points of contact are listed in Appendix C.

Sources	Type Assistance
DCSPER, HQDA	MANPRINT Policy MANPRINT Assessment
U.S. Army Human Engineering Laboratory (HEL)	Human Factors Engineering Assessment (HFEA) Army-HFE Domain Technology Base Research Army-HFE Domain Methodology/ Automated Tool Development HFE Standards/Design Criteria MANPRINT Assessments (non major systems)
U.S. Army Health Services Command (USAHSC)	Health Hazard Issues
U.S. Army Medical Research and Development Command (USAMRDC)	Health Hazard Issues
U.S. Army Operational Test and Evaluation Agency (OTEA)	MANPRINT Operational Testing
U.S. Army Test and Evaluation Command (TECOM)	MANPRINT Testing
The Surgeon General of the Army (TSG)	Health Hazard Assessments Biomedical/Health Standards

Figure 18. Human Factors Engineering Sources of Assistance

2.5.3 **References.** Sample Human Factors Engineering references are listed in Figure 19. See Appendix A for additional references.

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AR 602-1	Human Factors Engineering Program
AR 602-2	Manpower and Personnel Integration (MANPRINT) in the Materiel Acquisition Process
MIL-STD-1472	Human Engineering Design Criteria for Military Systems
MIL-STD-1474	Noise Limits for Army Materiel
MIL-STD-1567	Work Measurements
MIL-HDBK-759	Human Factors Engineering for Army Materiel
MIL-HDBK-761A	Human Engineering Guidelines for Management Information Systems
MIL-HDBK-763	Human Engineering Procedures Guide
MIL-H-46855	Human Engineering Requirements for Military Systems, Equipment and Facilities
Aeronautical Design Standards ADS-30	Human Engineering Requirements for Measurement of Operator Workload
TR-89/027	1988 Anthropometric Survey of U.S. Army Personnel Statistics Interim Report (U.S. Army Natick RD&E Center Technical Report).

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Figure 19. Sample Human Factors Engineering References

## 2.6 System Safety

2.6.1 **Definition.** System safety is the application of engineering and management principles, criteria, and techniques to optimize safety within the constraints of operational effectiveness, time, and cost throughout all phases of the system or facility life cycle. It involves the identification of hazards and their elimination, or adequate control. Systems safety management ensures the planning, implementation, and completion of tasks and activities to meet system safety requirements, consistent with overall program goals. Safety considerations are incorporated into the soldier-machine interface design to satisfy stated tasks, conditions, and standards, and into test and evaluation.

- 2.6.2 **Sources of Assistance.** Agencies and the type of assistance they can provide in the System Safety domain are listed in Figure 20. Specific points of contact are listed in Appendix C.

Sources	Type Assistance
AMC Safety Office	Safety and Health Issues Safety Assessment Reports for Technical Tests System Safety Risk Assessments Safety and Health Data Sheets to support Type Classifications, Materiel Releases, and Milestone Reviews  Interpret Army Safety Policy for MSCs and AMC Project Managers
USAMRDC	Health and Safety Issues Medical Materiel Development and Acquisition
USAHSC	Health Hazard Assessments for Materiel Systems
U.S. Army Safety Center (USASC)	System Safety Issues Safety Assessment Reports Accident Data Base (Army Safety Management Information System, ASMIS)
TSG	System Health Assessments Biomedical/Health Standards Use of volunteers in Testing and Evaluation (T&E)
TECOM	Safety Issues Safety releases for troop testing Safety confirmations for type classification/materiel release Safety testing expertise

Figure 20. System Safety Sources of Assistance

- 2.6.3 **References.** Sample System Safety references are listed in Figure 21. See Appendix A for additional references.



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AR 385-10	Army Safety Program
AR 385-16	Systems Safety Engineering and Management
AR 385-32	Protective Clothing and Equipment
AR 602-2	Manpower and Personnel Integration (MANPRINT) in the Materiel Acquisition Process
MIL-STD-882	System Safety Program Requirements
MIL-STD-1290	Light Fixed and Rotary-Wing Aircraft Crashworthiness
MIL-STD-1425	Safety Design Requirements for Military Lasers and Associated Support Equipment
DA PAM 385-16	System Safety Engineering and Management Guide
AMC Reg 385-29	Laser Safety

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Figure 21. Sample System Safety References

## 2.7 Health Hazard Assessment

**2.7.1 Definition.** Health Hazard Assessment involves the application of biomedical knowledge and principles to identify, evaluate, and control risks to the health and effectiveness of personnel who test, use, maintain, and support Army materiel. A health hazard is any existing or likely condition, inherent in the operation or use of materiel, which can cause death, injury, acute or chronic illness, disability, or reduced job performance of personnel by exposure to:

- Acoustical Energy (steady state noise, impulse noise, blast overpressures)
- Biological Substances (Pathogenic microorganisms and sanitation)
- Chemical Substances (Weapon/engine combustion products and other toxic materials)
- Oxygen Deficiency (confined spaces and high altitude)
- Psychological Stresses (The effects of nuclear, chemical and electronic warfare, and the result of continuous operations)
- Radiation Energy (ionizing and non-ionizing - to include lasers)
- Shock (acceleration/deceleration)
- Temperature Extremes and Humidity (heat and cold injury)
- Trauma (blunt, sharp, or musculoskeletal)
- Vibration (whole body and segmental).

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- 2.7.2 **Sources of Assistance.** Agencies and the type of assistance they can provide in the Health Hazard Assessment domain are listed in Figure 22. Specific points of contact are listed in Appendix C.

Sources	Type Assistance
AMC	Technical Testing Monitoring of HHA
USAMRDC	Health Hazard Issues Medical Materiel Development and Acquisition Biomedical Technical Data Base
USAHSC	Health Hazard Issues Health Hazard Assessments
TRADOC	MANPRINT Issues in Doctrinal, Combat, and Training Development
TECOM	Health Hazard testing expertise: noise, blast over-pressure, toxic gases
TSG	System Health Hazard Assessments Biomedical/Health Standards Use of volunteers in T&E Overall HHA Program Management
Walter Reed Army Institute of Research (WRAIR) Division of Neuropsychiatry	Psychological Issues Continuous Operations

Figure 22. Health Hazard Assessment Sources of Assistance

- 2.7.3 **References.** Sample Health Hazard Assessment references are listed in Figure 23. See Appendix A for additional references.

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AR 40-5	Health and Environment
AR 40-10	Health Hazard Assessment in Support of the Army Materiel Acquisition Decision Process
AR 40-14	Control and Recording Procedures for Exposure to Ionizing Radiation and Radioactive Materials
AR 40-46	Control of Health Hazards from Lasers and Other High Intensity Optical Sources
AR 40-583	Control of Potential Hazards to Health from Microwave and Radio Frequency Radiation
AR 70-25	Use of Volunteers as Subjects of Research
AR 385-9	Safety Requirements for Military Lasers
AR 385-11	Ionizing Radiation Protection, Licensing, Control, Transportation, Disposal, and Radiation Safety
AR 602-2	Manpower and Personnel Integration (MANPRINT) in the Materiel Acquisition Process
MIL-HDBK-759	Human Factors Engineering Design for Army Materiel
MIL-STD-858	Testing Standard for Personnel Parachutes
MIL-STD-1290	Light Fixed and Rotary Wing Aircraft Crashworthiness
MIL-STD-1294	Acoustical Noise Limits in Helicopters
MIL-STD-1472	Human Engineering Design Criteria for Military Systems Equipment and Facilities
MIL-STD-1474	Noise Limits for Army Materiel
TB MED 81	Cold Injury
TB MED 265	Threshold Limit Values for Toxic Chemicals and Certain Electromagnetic Radiation
TB MED 501	Hearing Conservation
TB MED 502	Respiratory Protection Programs
TB MED 506	Occupational Vision
TB MED 507	Prevention, Treatment, and Control of Heat Injury
TB MED 523	Control of Hazards to Health from Microwave and Radio Frequency Radiation and Ultrasound

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Figure 23. Sample Health Hazard Assessment References

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## WRITING THE RFP TECHNICAL REQUIREMENTS

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### Pre-RFP Activities

AMC is required by AR 602-2 to provide the MANPRINT manager for all AMC developed materiel systems. In the unlikely event that the MANPRINT manager is unknown to the RFP writer, the first task is to make this contact. By the time you begin drafting the RFP technical requirements for a system, many events and activities will already have taken place concerning that system. Some of them are important in shaping the structure and content of the RFP. In the following paragraphs, some significant activities and actions will be discussed. For each pre-RFP activity or action, the subparagraphs below will identify:

- a. *What* the activity or action is,
- b. *Who* is responsible, and
- c. *How* it relates to the RFP.

#### 3.1.1 TRADOC MANPRINT Joint Working Group (MJWG)

- a. The MJWG is a committee to manage MANPRINT issues during the materiel acquisition process. The exact make-up and leadership is determined by the TRADOC proponent school based on assets available and the type of acquisition conducted. A representative of AMC usually attends MJWG meetings. Suggestions for additional representation include Directorate of Combat Developments, Directorate of Training and Doctrine, Directorate of Evaluation and Standardization, Safety Office, Proponency Office, HEL, ARI, Office of the Surgeon General, Integrating Centers, AMC/MSD/PM MANPRINT Manager, PM TRADE, AMC independent evaluator and supporting proponent schools.

- b. The MJWG is established by the TRADOC proponent school. MJWG responsibilities include:

Writing the SMMP

Planning for MANPRINT analyses

Developing the Target Audience Description (TAD)

- c. The MJWG is the focal point for system MANPRINT issues during TRADOC's formulation of the requirements document. If the drafter of the RFP technical requirements is not a member of the MJWG, contact should immediately be established with the AMC representative to the MJWG or with the group itself through the TRADOC proponent school. The key document to obtain is the SMMP.

### 3.1.2 System MANPRINT Management Plan (SMMP)

- a. The SMMP is the MANPRINT management guide that is prepared by the MJWG for each development, non-developmental, and materiel change (product improved) system. It is a plan which identifies the important MANPRINT issues anticipated in the system acquisition and outlines the proposed actions to resolve these issues. It is the first program management document in the entire acquisition cycle and is initially prepared by the MJWG in the same time-frame as the O&O Plan. Personnel preparing the O&O Plan should address the concerns expressed in the SMMP in the appropriate areas of the O&O Plan (e.g., Paragraph 7).
- b. The SMMP is initiated by the TRADOC proponent school MJWG, prepared with the assistance of AMC, and approved by both TRADOC and AMC.
- c. The SMMP functions as an audit trail to identify all the tasks, analyses, trade-offs, and decisions that affect MANPRINT issues of a system. However, the SMMP itself is not a collection of documents. The documents must be obtained from other sources. If the RFP drafter has a question concerning a MANPRINT issue, the SMMP is the first place to look for an answer or for guidance concerning how that issue has been treated.

### 3.1.3 Test and Evaluation Master Plan (TEMP)

- a. The TEMP is a broad plan that relates test objectives to required system characteristics and performance requirements, including MANPRINT issues, in the system acquisition.

- b. The TEMP is prepared by the materiel developer in coordination with the Test Integration Working Group (TIWG). The materiel developer, the combat developer, the testing community, the trainer, and others are represented on the TIWG.
- c. The drafter of the RFP technical requirements should ascertain whether a TEMP exists and, if it does, should search the TEMP for MANPRINT issues and criteria (usually found in the Independent Evaluation Plan (IEP) or an Independent Evaluation Report (IER) if there has been a previous phase of development of the system. The RFP drafter must ensure that MANPRINT issues not only are identified, but are included in the appropriate test and evaluation portions of the RFP as well. Whether or not required by the TEMP, the RFP should require the collection of individual soldier performance data during all system operation and maintenance testing (see AR 602-2, para 2-11). If the TEMP is perceived to be deficient in the test and evaluation of one or more MANPRINT domains, the deficiencies should be brought, through proper channels, to the attention of the TIWG and MJWG.

#### 3.1.4 Cost and Operational Effectiveness Analysis (COEA)

- a. A COEA is prepared to support decision milestones regarding materiel acquisition. This analysis is a comparative evaluation of the competing alternatives generally defined as systems and programs. It identifies the relative effectiveness and associated costs of each alternative in order to assist decision makers in selecting the preferred course of action to meet an identified need.
- b. The combat developer is responsible for initiating, performing, and reporting the cost effectiveness analysis. In special cases the analysis will be prepared by or under the supervision of a special task force or special study group. On occasion an agency outside the Army may prepare an independent analysis directed by Congress; Office, Secretary of Defense (OSD), or HQDA. In all cases, the materiel developer is a major participant and contributor to the analysis.
- c. One can expect to find estimates of manpower and personnel costs in the COEA, including training costs and projections of the cost of recruiting and retaining soldiers with the required aptitudes.

### 3.1.5 Cost and Training Effectiveness Analysis (CTEA)

- a. For training programs, a CTEA will be conducted as part of a system specific COEA or as a separate analysis. The CTEA is conducted to compare alternative training programs for systems in development or already fielded systems in the same manner that the COEA is conducted for hardware systems and programs.
  - b. Like the COEA, the CTEA is the responsibility of, and is usually prepared by, the combat developer. The CTEA frequently addresses training devices, simulators and simulations as part of the training program. Therefore, as with the COEA, the materiel developer is a major participant and contributor to the CTEA.
- The CTEA will address the manpower and personnel resources and costs for the training program alternatives addressed.

### 3.1.6 MANPRINT Assessment

- a. This assessment is conducted prior to milestone decision reviews on all acquisition programs. The objective of the MANPRINT Assessment is to provide an indication--at a particular point in the project's development--of the likelihood that the eventual manned system will meet its performance requirements. Note those last two words, "performance requirements". The MANPRINT Assessment does not calculate a "score" for each of the six separate domains; but, rather, predicts how the *manned system* will meet its *performance requirements*.
- b. The ODCSPER, HQDA is responsible for the MANPRINT Assessment on all major defense as well as Army managed acquisition programs. AMC, in coordination with TRADOC, prepares, through HEL, the MANPRINT Assessment on all nonmajor Level I, II and III programs for which AMC has oversight. Per AR 70-1, these MANPRINT Assessments are conducted for Milestone 0 through Milestone III.
- c. If a MANPRINT Assessment exists from a prior phase of system development, it offers the opportunity to review MANPRINT issues that were previously found to affect the system under consideration, and to identify issues that should be addressed in the Statement of Work (SOW). The drafter of technical requirements should also review the PM's response to issues raised in the MANPRINT Assessment to determine planned fixes to those issues.



### 3.1.7 Trade-Off Analysis (TOA)

- a. The TOA contains the mission and performance rationale, analysis of system trade-offs, and the selection of the best technical approach from an operational and logistical standpoint.
- b. The TOA is jointly prepared by the combat and materiel developers.
- c. The RFP drafter can expect to find information identifying critical design factors and potential MANPRINT cost drivers.

### 3.1.8 Target Audience Description (TAD)

- a. The TAD is a quantitative and qualitative description of the soldiers and civilians who will operate, maintain, and support the equipment in a proposed system. Among the most important parts of the TAD is the description of the aptitude score distributions of the soldiers who are planned to be the primary operators and maintainers. Soldier aptitude has been found to be an important determinant of training time and cost. The TAD also contains information on other soldier characteristics, such as physical characteristics.

When soldiers who are representative of the TAD provide comments and judgments relating to the design and operation of a system, they are referred to as a "user jury" or "user juries."

- b. The TRADOC proponent school's MJWG is responsible for developing the TAD. If assistance is needed in this area, contact the TRADOC proponent school combat developer.
- c. The RFP drafter must draw upon the information contained in the TAD to communicate to potential offerors the essential mental and physical capabilities of the soldiers who will operate, maintain, and support the various items of equipment in the proposed system.

### 3.1.9 Operational and Organizational Plan (O&O Plan)

- a. The O&O Plan is the program initiation document for all materiel acquisition programs except major systems requiring a Mission Need Statement (MNS) or systems requiring a Training Device Need Statement (TDNS). It outlines how a system is planned to be used and supported, how it will ultimately contribute to combat capability, and in what

### Chapter 3 - Writing the RFP Technical Requirements

organizations the system's different items of equipment will be placed. If applicable, it identifies the materiel to be replaced. Paragraph 6, Organizational Plan, and Paragraph 7, System Constraints, of the O&O Plan may contain statements of significant MANPRINT impact.

- b. The O&O Plan is prepared by the combat developer in coordination with others. It is approved by the Commander, TRADOC.
- c. The O&O Plan is a source document for the ROC. MANPRINT requirements and constraints would normally flow from the O&O Plan through the ROC to the RFP as explained below. In the event the draft O&O Plan has been provided to potential offerors for comment, the RFP drafter should review industry comments for additional MANPRINT concerns.

#### 3.1.10 Required Operational Capability (ROC)

- a. The ROC is a formal requirements document which, when approved and funded, commits a program to a development or production decision. Usually it will not be approved until proof of principle has been conducted under an approved O&O Plan. The ROC identifies the threat; operational; reliability, availability, and maintainability (RAM); technical; MANPRINT; logistical; and cost information necessary to start development or acquisition of a materiel system. Paragraphs 5 and 8 in all new ROCs address MANPRINT concerns.
- b. The ROC is prepared by the proponent combat developer in coordination with HQDA; materiel developer; training developer; rationalization, standardization, and interoperability (RSI) manager; logistician; MANPRINT planner; tester and evaluator; and interested major command (MACOM).
- c. The ROC is a prime source of input for the RFP. The performance requirements of the manned system should be expressed in objective, quantitative terms; the maximum tolerable training burden should be stated; and the likely aptitudes of the soldiers in the system should be identified. These three essential ROC requirements--plus any direct manpower limitations (e.g., "Crew size shall be no more than three")--are used by the RFP drafter to set the parameters for subsequent trade-off analyses to be performed by the contractor (see Figure 26). In the event the draft ROC has been provided to potential offerors for comment, the drafter of RFP technical requirements should also review industry comments for additional MANPRINT concerns.

### 3.2 MANPRINT and System Performance

The task of preparing MANPRINT technical requirements for an RFP will be greatly facilitated if the writer will keep in mind that the ultimate goal of MANPRINT in the materiel acquisition process is to enhance system performance and effectiveness in the field. In this context, the system includes both the equipment and the soldiers who operate and maintain it. The enhancement of system performance can realistically occur only within the personnel, manpower, total force, cost and other constraints on the Army in the real world. In preparing RFP input, the MANPRINT technical requirements writer should view the task as an effort to deal efficiently with "soldier-related" constraints in a coherent and coordinated way to enhance the performance and effectiveness of the system being procured. The astute writer will draw upon subject matter experts from the six MANPRINT domains to the extent that time and availability permit (see Appendix C) and, through selection, coordination, and tailoring, prepare and express in non-duplicative terms the set of MANPRINT requirements most appropriate to the procurement at hand.

### 3.3 Drafting the RFP Technical Requirements

The definition process (Figure 4) is essentially an analytic process that converts system requirements with MANPRINT implications (and by this point in the development, these should be explicitly identified as MANPRINT requirements) into specific actions required of contractor personnel and specific characteristics to be exhibited in the hardware and software produced by the contractor. It is helpful to think in terms of the deliverables such as the hardware, software, technical publications, etc., in light of each of the six MANPRINT domains. These domains should be evaluated from the perspective of operations, maintenance, and support, considering in turn the individual soldier, the crew, and the unit. The MANPRINT process demands "system thinking" of the broadest and most comprehensive type. In preparing RFP clauses, never lose sight of the fact that MANPRINT is an integration effort to assure system effectiveness (see Figure 1), and therefore, performance is the bottom line. The preparation of RFP MANPRINT clauses begins with a thorough review of the ROC for MANPRINT requirements. In ROC documents written after MANPRINT was implemented Army-wide, paragraph 8, MANPRINT and paragraph 5, Operational Characteristics, are the places to begin. Paragraph 8 contains explicit MANPRINT requirements arranged by domain, while Paragraph 5 may contain implicit MANPRINT requirements (concerning soldier performance). In documents originating before the implementation of the program, MANPRINT is interwoven with other requirements such as ILS, and a little more effort is required to isolate and extract the MANPRINT issues. In either situation, it is helpful to examine the O&O Plan for MANPRINT matters that need to be carried forward into the RFP.

The balance of this chapter occasionally contains illustrative examples of MANPRINT requirements couched in terms suitable for an RFP. It must be emphasized that these paragraphs are illustrative. They show, in general, how the MANPRINT requirements for major, complex materiel (a tank or an aircraft) might be organized and expressed. While they are realistic, they are neither all-inclusive nor totally applicable to every RFP. They should not be copied in bulk, but should be thoughtfully selected and adapted to the MANPRINT needs of the materiel being procured, as has been done in the example RFPs in Chapters 4 and 5.

### 3.3.1 Converting ROC Statements to RFP Requirements

When the requirements document (e.g., a ROC prepared by TRADOC) has been prepared in accordance with AR 71-9 and AMC/TRADOC Pamphlet 70-2, this is a relatively simple process. The requirements document will contain four essentials illustrated in the upper portion of Figure 24. The RFP drafter then incorporates those essential MANPRINT constraints in appropriate portions of the RFP (as explained below). However, where any one of those essentials is missing from the requirements document (as is frequently the case in ROCs produced before promulgation of the MANPRINT program), the RFP drafter needs to refer to paragraph 3.3.4 of this document to learn how to produce the missing essentials.

- a. Soldier Identification. Either the TAD or a replacement for the aptitude portion (as explained in paragraph 3.3.4 below) should be included in the personnel subsection of the System Specification.

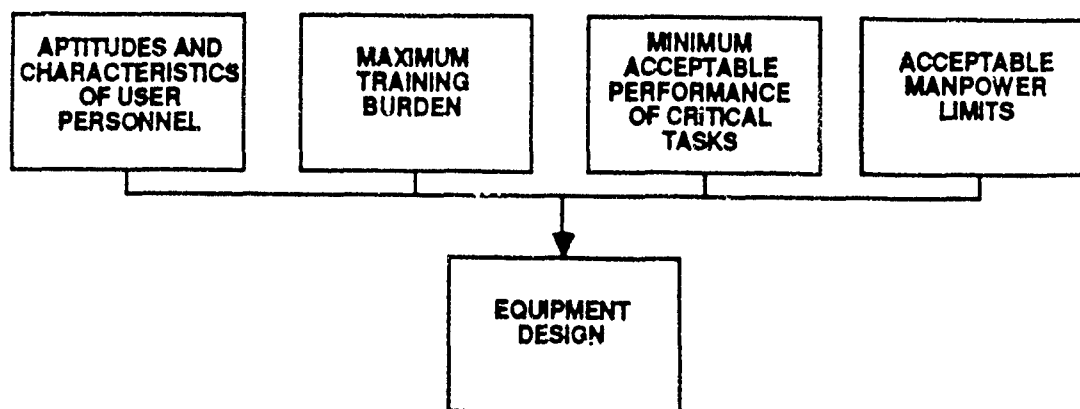


Figure 24. Establishing the Parameters for MANPRINT Trade-offs

- b. **Training Burden.** Either the TRADOC-developed training burden (in time and cost dimensions) or a replacement statement (developed as explained in paragraph 3.3.4 below) should be included in the training subsection of the System Specification.
- c. **Soldier Performance Standards.** Either the existing standards drawn directly from the requirements document or standards derived from analysis and interpolation of whatever system performance requirements do exist (as explained in paragraph 3.3.4 below) should be written into the performance characteristics section of the System Specification.
- d. **Manpower Limits.** The limitations and requirements for the organizational structure to which the equipment will be assigned should be found in the organizational section of the ROC and O&O Plan. That information should be referenced in that portion of the scope of work which requires the contractor to determine the most cost-effective organization(s) for manning the system.

### 3.3.2 ROC Paragraph 8, MANPRINT and ROC Paragraph 5, Operational Characteristics

The RFP drafter should begin with paragraph 8, as this is the central source of MANPRINT requirements information. In a well-written ROC, this section will contain the four MANPRINT elements shown in the top portion of Figure 24. Examine this section in detail and include in the RFP those MANPRINT requirements that the contractor needs to address. For example, paragraph 8 should have a manpower/force structure assessment which estimates manpower requirements per system, per unit and the total Army, including Active, Army National Guard (ARNG), and Reserve (USAR) forces. In addition, examine this section in detail and separate items that are solely Army responsibility from those that the contractor needs to address, and include the latter in the RFP. (For example, a requirement to reduce manpower requirements by Army component is essentially an Army issue which should not affect the contractor. However, if increases in force structure are required, those increases are likely to affect the contractor's work and should, therefore, be included in the RFP.) Also include any government furnished information that the contractor will need in fulfilling contract requirements, such as the TAD. In most cases the requirements of Paragraph 8 can be transferred directly into the RFP using the illustrations that appear later in this chapter and the RFP examples in Chapter 4 and 5 as guides.

In ROC Paragraph 5, look for system performance requirements (effectiveness and availability) which have direct impact on MANPRINT. Also determine if there are soldier-machine interface (SMI) issues in this section. SMI impacts on the manpower, personnel, and training domains as well, making it a good place to start. Keep in mind that most Army materiel must be operable and

maintainable by both male and female soldiers. Look for the workload and task difficulty placed on the soldier. These can influence crew size, personnel skill-levels, and training resources required. Information and communication interfaces also are highly important. Information is useful to the soldier only if it is visible, audible, legible, or intelligible and then only if it is comprehensible. This applies to information from machine to soldier and from soldier to soldier. The MANPRINT requirements derived can be converted into RFP requirements following the examples appearing later in this Chapter and the RFP examples of Chapters 4 and 5.

### 3.3.3 Considering Other MANPRINT Requirements Sources

As noted, many activities will have taken place by the time the RFP drafting is begun. However, the RFP may have to be constructed while some of the supporting documents are being written by other agencies. The RFP drafter may find it necessary to use draft versions of these supporting documents during preparation of the RFP. The ROC and the O&O Plan are prime sources of MANPRINT input into the RFP. If the ROC or O&O Plan have not yet been prepared or are inadequate in the MANPRINT area, the MANPRINT Assessment may provide the needed coverage. This Assessment can be a helpful source of MANPRINT issues, some of which may need to be translated into contractual requirements. Additionally, the ILS Manager may be able to offer information on manpower, personnel, training, and safety which may be available from a LSA in an earlier phase of the materiel acquisition process.

### 3.3.4 Bridging Gaps in MANPRINT Requirements

For MANPRINT requirements to be effective in influencing the design of system hardware and software, all four of the essential components identified earlier must be evident: (1) identification of the aptitudes of the soldiers who are projected to be the system operators and maintainers, (2) statement of the maximum training burden (in terms of time and cost) that the Army can bear for the new system, (3) statement of the minimum acceptable performance expected from the soldier-machine system, and (4) statements of any manpower or organizational limitations and requirements for the most cost efficient use of manpower. If any one of those four parts is missing, the system designer (contractor) is offered an escape from what is intended to be the responsibility of his design team for the ultimate performance of the system in the field with Army troops. Consequently, where any of the first four essential MANPRINT requirements shown in Figure 25 are missing, they must be created and included in the appropriate place in the RFP.

- a. **Manpower Limitations.** If manpower constraints are missing from the O&O Plan and the ROC, the RFP drafter should check to see if a HARDMAN analysis was conducted earlier. Findings from such analyses are helpful in creating the manpower constraints needed for the RFP. In the absence of HARDMAN information, the RFP drafter should require in the SOW that the contractor develop an organizational structure which includes the operations, maintenance, and support elements needed to support the system mission. At a minimum, the structure evaluated should contain the operator, maintenance and support considerations for the item of equipment under development. Analyses of minimal organizational structures should be conducted and the results traded-off with training cost and overall cost to the Army.
- b. **Soldier Identification (Characteristics of User Personnel).** If the Target Audience Description is missing, soldier aptitude requirements inclusion in the RFP can be created by identifying the MOS of the personnel forecasted as operators and maintainers, and then noting the minimum "qualifying score" on the Armed Services Vocational Aptitude Battery (ASVAB) subtests that determine each MOS. The aptitude range for each personnel position can be determined by calculating the lowest 20% of aptitude scores in that MOS.

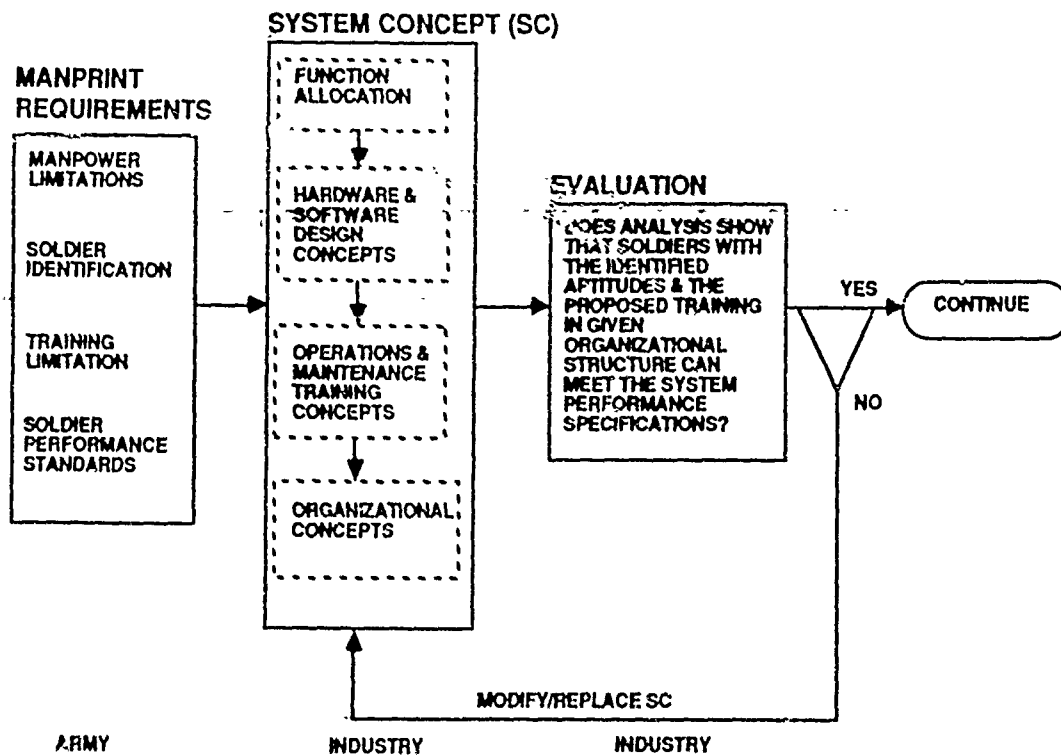


Figure 25. How MANPRINT Requirements Affect Initial Design Concepts

- c. **Training Limitation (Maximum Training Burden).** Statement of this burden presupposes that the TRADOC combat developer who originated the requirements document has inventoried the training resources his center has available (considering all of the institutional training which must be supported for all of the systems for which that school is the proponent) and has carefully calculated what could be made available for the new system. In similar fashion, unit training demands in terms of time, supplies, devices and facilities must be assessed against available resources. For example, the Army Reserve and National Guard have a limited number of training days per year (37 and 38 days respectively); if the training requirement exceeds available days, then their training readiness will suffer. How many training days does an active Army unit have after subtracting time for exercises, Army Training Evaluation Program (ARTEP), maintenance, and local command requirements? Will the sustainment training requirement fit in the available training box? If not what are the alternatives if training readiness is to be maintained? Where no such calculation has been made, the RFP drafter can calculate a rough equivalent by determining the time and cost of both institutional and unit training for the system which will be replaced by the system about to be acquired. Where a predecessor system exists, the training time required to support it can be used as a rough baseline, and a requirement not to exceed or to reduce that time might be included in the RFP. Since TRADOC will normally have an opportunity to comment on the completed first draft of the RFP, TRADOC will have an opportunity to correct any errors in such an approximation of the training burden.
- d. **Soldier Performance Standards.**
- (1) In making equipment design decisions it is important to remember that different combinations of aptitude and training can produce acceptable soldier performance. Since acquiring high-aptitude personnel or training low-aptitude personnel increases Army costs, there is a trade-off which the Army wants the contractor's design team to make between the use of high-aptitude personnel and the need to provide excessive training for low-aptitude personnel. The contractor cannot make the design trade-off (Figure 26) unless he knows what level of performance is minimally acceptable.
  - (2) Soldier performance standards can be developed analytically from system performance specifications (as explained in detail in Reference 109). The RFP drafter needs to determine the "minimum acceptable performance" value shown in Figure 26 in order for the contractor to be able later to perform the trade-off illustrated in that figure. Even where the requirements document may be ambiguous on some system performance requirements, the analytic process that is necessary to determine minimum acceptable soldier performance can be accomplished by:



- (a) identifying the system missions and stating them in terms of actions to be performed (Appendix A of Reference 110).
- (b) analyzing those actions in terms of the functions to be performed by the hardware, software, and soldiers (Appendix B of Reference 110).
- (c) determining the critical soldier tasks for operations, maintenance, and support of the system (Appendices C and D of Reference 110).
- (d) calculating the time and accuracy requirements of each critical task based on the overall system performance requirements and (if available) the system error budget.

### 3.3.5 Coordination of MANPRINT RFP Requirements

From the MANPRINT viewpoint, it is important that the draft RFP be coordinated with the System MANPRINT Manager, the MJWG, the TRADOC System Manager, and the ILS Manager. In the absence of a MJWG, coordina-

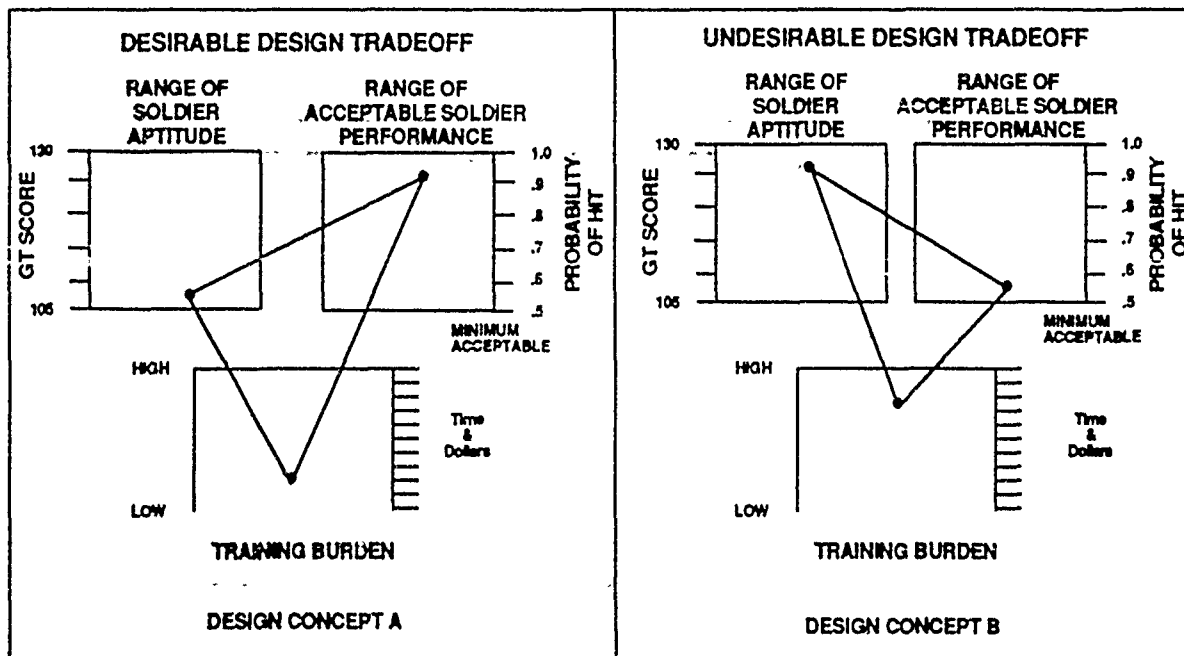


Figure 26. Example of Aptitude, Training, and Soldier Performance Trade-offs

tion should be made with appropriate agencies selected from among those listed in Chapter 2. This coordination should occur before the MANPRINT technical requirements are submitted to the Contracting Officer.

#### 3.4 MANPRINT in the RFP Structure

The primary task of an RFP drafter is to convey to industry what it is that the government wishes to procure. Two skills are required: first, mastering the many technological areas that must be covered in the RFP for a major system and, second, understanding the laws, regulations, and policies that govern RFP format and content. Few individuals are experts in both. Consequently, this handbook has been prepared to assist technological experts in communicating with procurement specialists in preparing an RFP. It is important for the technological expert to understand that an RFP has a reasonably standard format that enables industry to develop competence in reading and interpreting RFPs. An approach (like MANPRINT) to technical requirements does not obviate the need for its practitioners to learn the well-established rules for communicating with industry. In particular, it is important for the MANPRINT expert to realize that there is not just a single place in the RFP where MANPRINT matters should be included, but at least six:

- a. The Executive Summary explains to senior industry personnel the major emphases in the procurement. This is most effectively accomplished by summarizing the weighing of issues in the source selection process. The role of MANPRINT in source selection should be made clear.
- b. The Statement of Work (SOW) states what the Army wants the contractor to do (i.e., task statements) in developing the system. It describes deliverables to be provided under the contract and the work to be done to assure that the developed system performs as specified.
- c. The System Specification describes how the system hardware and software is supposed to appear and perform (in Section 3), and how that appearance and that performance are to be verified (in Section 4).
- d. The Contract Data Requirements List (CDRL) explains to an offeror what information (often reports) the contractor will be required to furnish to the government about the tasks being accomplished and the performance of the hardware and software being developed, how often, and in what form. The process for preparing a CDRL is complex and highly structured. In general, once the needed MANPRINT data are identified, the specific data requirements and schedule of delivery are spelled out in the RFP using DD Form 1423, "Contract Data Requirements List (CDRL)". Each data item is keyed to a tasking in the SOW or to a specification requirement. The data must be described in terms of standardized Data Item Descriptions (DIDs) which are themselves cataloged in the Acquisition Management Systems and Data Requirements

Control List (AMSDL). Reference 111 provides an excellent and highly readable explanation of the data requirements specification process.

- e. Instructions to Offerors contains many helpful hints to an offeror trying to write a responsive proposal. These instructions often include coordination statements (e.g., that the MANPRINT and ILS programs should not be conducted in a duplicative fashion), and instructions on what specific matters must be covered in detail in the technical proposal.
- f. Proposal Evaluation Criteria explain to an offeror how his technical proposal will be evaluated by the Source Selection Evaluation Board (SSEB). Both technical criteria and relative importance are shown.

The emphasis to be accorded to MANPRINT in a specific contract should be determined by the government before the solicitation is prepared. This decision will guide the requirements for MANPRINT effort throughout the RFP and will determine the relative cost of the MANPRINT work under the contract. Part of the writer's task is to carry out this general guidance by preparing specific MANPRINT requirements for each of the above elements of the RFP. These must be carefully selected and balanced to obtain the maximum benefit from the total MANPRINT effort expended. That is to say that the requirements in the SOW and System Specification (if there is one; see Figure 27) must be carefully coordinated, and the CDRL should order only the minimum amount of data needed. After the system MANPRINT requirements are expressed in the SOW and system specifications their impact is enhanced by linking them to the proposal award evaluation factors. This is done in Section L (Instructions and Conditions and Notices to Offerors) and Section M (Evaluation and Award Factors) of the RFP. The emphasis on MANPRINT in Sections L and M reflects the degree of importance that the Army attaches to MANPRINT, helps the contractor prepare his proposal, and guides the source selection process (See Reference 124). In any RFP, Section L must be consistent with the emphasis and weighting factors afforded MANPRINT in Section M. The emphasis to be placed on MANPRINT can then be summarized and conveyed to industry in the Executive Summary.

#### 3.4.1 MANPRINT in the Statement of Work (SOW)

- a. General. Within an RFP, the SOW identifies the broad requirements which the Army wants the contractor to address during a specific phase of system development. The focus is on the contractor and the SOW language defines the minimum required contractor efforts. Depending upon the development phase, a typical SOW might task the contractor to conduct analyses; to implement a MANPRINT program; to collect and analyze human performance data on equipment mockups or prototypes; to analyze the results of cost, schedule, and performance trade-offs; or to perform MANPRINT test and evaluation activities. General guidance for writing a SOW is contained in MIL-HDBK-245. This reference explains

what goes into different types of SOWs and how to tailor SOW statements to complement requirements which may appear elsewhere in the RFP. The Handbook also describes the solicitation documentation appropriate to specific system development phases. Documentation for several of the phases is summarized in Figure 27. Technical data requirements stemming from the SOW are described using Data Item Descriptions (DIDs) and delivery is ordered using the Contract Data Requirements List (CDRL).

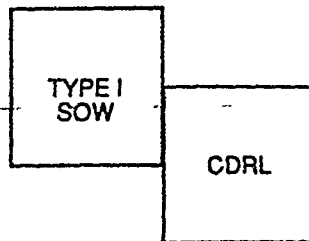
- b. Specific. Unfortunately, the portion of MIL-HDBK-245 dealing with the *organization* of the SOW is substantially out of date. While an occasional contracting officer will insist on following it anyway, most contracting officers can be expected to exercise their permitted discretion and to locate all MANPRINT requirements in a single subparagraph of paragraph 3. Grouping all MANPRINT requirements together considerably aids industry in understanding the scope of the program and the level of resources which are likely to be required. The technical requirements *within* the MANPRINT paragraph may be organized in a variety of ways. Two different organizations of MANPRINT technical requirements in a SOW are presented in the examples used in this handbook. Both of these approaches are modeled after real SOWs used in the acquisition of materiel. Other approaches to organizing the materiel are acceptable, and the writer will need to look to his agency guidance for specifics. In the example in this chapter and in Chapter 4, the MANPRINT technical requirements in the SOW are organized around the following outline:

- ..(1) General MANPRINT program requirements
- (2) Requirements within each MANPRINT domain
  - (a) Plans
  - (b) Specific technical requirements
- (3) MANPRINT test and evaluation - all domains
- (4) MANPRINT reviews - all domains

In the SOW in Chapter 5, the order of the MANPRINT technical requirements follows the outline:

- (1) General MANPRINT program requirements
- (2) Requirements within each MANPRINT domain (as appropriate)
  - (a) Plans

CONCEPT EXPLORATION  
DOCUMENTS

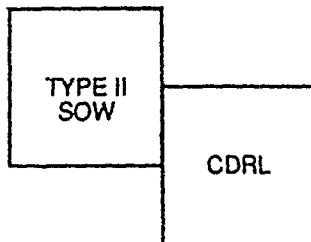


NO SPECIFICATION

DOCUMENT CONTENT

- PROGRAM OBJECTIVES
- MISSION, SCHEDULE AND COST GOALS
- PARAMETERS FOR TRADE-OFFS

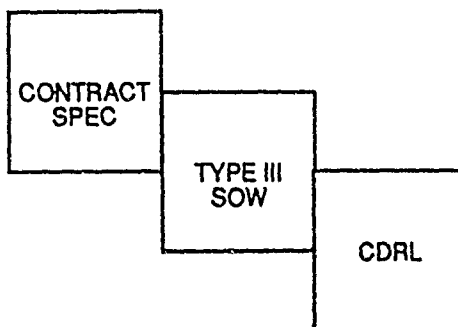
DEMONSTRATION AND VALIDATION  
DOCUMENTS



SPECIFICATION OR TECHNICAL  
DOCUMENT PERMITTED

- PRELIMINARY DESIGN PARAMETERS
- PROGRAM PLANNING TASKS
- HARDWARE PROOFING TASKS
- SYSTEM DEFINITION TASKS
- DESIGN - TO - COST TARGET

FULL-SCALE DEVELOPMENT  
DOCUMENTS



- SYSTEM DESIGN TASKS
- SYSTEM DEVELOPMENT TASKS
- SYSTEM TEST AND EVALUATION
- PRODUCTION DOCUMENTATION

NOTE: Adapted from MIL-HDBK - 245B

Figure 27. Types and Contents of RDT&E Contract Documents

## Chapter 3 -- Writing the RFP Technical Requirements

- (b) Specific technical requirements
  - (c) Test and evaluation
  - (d) Reviews
- (3) General MANPRINT program reviews

It should be noted that the MANPRINT illustrative material which follows, and the example SOWs in Chapters 4 and 5, generally adhere to the provisions of MIL-HDBK-245. (Except that the MANPRINT SOW requirements are all located together, not fragmented throughout the document). Specifically, the SOW is written in terms of the work to be performed by the contractor. Where that work is intended to result in a deliverable product (e.g., a program plan, report of analysis, test plan, or test report), the delivery is ordered in the CDRL, which also references the applicable DID. AR 700-70 states that specifications, standards, and related documents (e.g., DIDs) must be selectively applied and "tailored" to impose the optimum set of essential requirements. Tailoring is the process by which individual requirements (sections, paragraphs, sentences, words) of the selected specifications, standards or related documents are evaluated to determine the extent to which they are applicable for a specific acquisition. It can be accomplished by specific citation or by deletion from a larger whole. In the case of DIDs, it can only be done by deletion. A more complete discussion of tailoring is contained in Reference 111 of Appendix A. The writer must ensure that specifications, standards and other references cited in the MANPRINT requirements of the RFP, (in Sections 3 of both SOW and/or System Specification) are also listed in the Document Summary List (DSL) of Section C of the RFP.

- c. MANPRINT Requirements in the Work Breakdown Structure. Many solicitations will include a preliminary Work Breakdown Structure (WBS) in accordance with MIL-STD-881A, Work Breakdown Structure for Defense Materiel Items. If a WBS is included in the RFP on which the writer is working, then it is important to contact those preparing that WBS to ensure that they properly include the contractor's MANPRINT labor (producing plans, conducting tests and analyses, and writing reports). Failure to include MANPRINT explicitly in the WBS usually means that the contractor will not be paid for performing MANPRINT work. Including MANPRINT fully in the WBS also has the benefits of working the program into the structure of the contract: MANPRINT will appear in the List of Supplies and Services (Section B of the RFP), and usually in its own Contract Line Item Number (CLIN).

### 3.4.1.1 General MANPRINT Program Requirements

This section defines the overall emphasis that the government places on the MANPRINT program within the specific RFP. The relative emphasis to be placed upon MANPRINT should be decided by such considerations as the type of materiel being acquired, the phase of development, MANPRINT priority, and available funds, to name a few. In this section the offeror is told what the government expects in terms of the objectives and scope of the MANPRINT effort; the professional level of program execution; and the relationship of the MANPRINT effort to other programs required by the RFP. Detailed MANPRINT requirements should appear in the later sections. This section should be both general and brief as illustrated by the example which follows.

(Note: Examples of MANPRINT applications throughout Chapter 3 are enclosed with a black border for ease of identification.)

#### EXAMPLE

### 3.8 MANPRINT

#### 3.8.1 Planning and Execution

An adequately staffed MANPRINT effort shall be dedicated to and be an integral part of the hardware and software analysis, design, development, and test process. A MANPRINT program limited to ex post facto review is not acceptable. Accordingly, a MANPRINT Program shall be planned and executed to meet the objectives, characteristics and constraints set forth below and in the System Specification. The program shall effectively integrate the MANPRINT domains with one another and with the design process, and shall show relationships with the ILS and Quality Assurance programs.

#### 3.8.2 Objective

The objective of the MANPRINT effort shall be to integrate all elements of the system involving soldier performance and safety and, based thereon, to influence system design so as to optimize total manned system effectiveness.

EXAMPLE - CONT'D

3.8.3 Scope

MANPRINT Program elements shall include manpower and personnel requirements, training programs, HFE, system safety considerations, and biomedical and health hazards. The emphasis of MANPRINT shall be on: (1) early recognition and resolution of soldier operational, maintenance, and support issues; (2) system performance (effectiveness and availability) to include personnel performance; and (3) fielding of a system which meets the total operational and support unit requirements. The MANPRINT Program shall be coordinated with QA, ILS, RAM, and LSA activities to achieve an integrated overall effort without duplication.

END OF EXAMPLE

3.4.1.2 Requirements Within Each MANPRINT Domain

This section sets forth the requirements for program plans within each MANPRINT domain and defines the scope of effort to be performed in each of the domains. The scope and level of effort in each domain must be tailored to suit the type of materiel being acquired and the acquisition phase. There is no general rule for establishing the scope and level of MANPRINT effort. Indiscriminate application of equal treatment to all domains could lead to pointless effort in some domains and inadequate effort in others. Each of six domains must be considered individually, and requirements must be prepared which are appropriate to the specific acquisition at hand. Except for the Manpower and Personnel domains, useful documentation exists in the form of approved military standards and/or specifications and Data Item Descriptions (DIDs). (See Table 1 and Appendix A). Follow-up action by the writer is necessary to assure that the MANPRINT technical requirements of this and subsequent sections are included in the costing provisions of the RFP (usually Section B). The contractor can hardly be expected to perform efforts for which he is not paid and ambiguity on this point may lead to future disputes. An example of MANPRINT domain requirements follows.



EXAMPLE

**3.8.4 MANPRINT Program Emphasis Areas**

Within the context of the above considerations, the MANPRINT program shall include as a minimum the following domains:

**3.8.4.1 Manpower and Personnel**

**3.8.4.1.1 Manpower and Personnel Program Plan**

A Manpower and Personnel Program (MAPP) Plan shall be prepared and delivered to the procuring activity IAW DI-[see draft DID in Appendix D], Sequence A\_\_\_\_\_ on DD Form 1423. The MAPP shall include, but not necessarily be limited to:

- a. A description of the analyses by which the contractor and subcontractors will address manpower and personnel issues and their impact on equipment design and performance, meet manpower and personnel constraints, and generate manpower and personnel information required by the contract.
- b. A description of the procedures for coordination of Manpower and Personnel Program activities with activities covered in the Human Engineering Program Plan and the Training Program and Training Equipment Plan.
- c. A description of the procedures for multiple use of common data, and procedures for coordination and avoidance of duplication of activities in the Logistics Support Analysis (LSA) and Integrated Logistic Support (ILS) program (e.g., Task analysis results).

**3.8.4.1.2 System Function Analysis**

A System Function Analysis (SFA) shall be conducted for each materiel design concept under consideration. The information may be obtained either from the Human Engineering System Analysis Report (HESAR) or LSA Task 301 depending on which is evoked. The SFA shall include, but not be limited to:

- a. A description of each operational, maintenance, and support function necessary for system performance and availability.

EXAMPLE - CONT'D

- b. An inventory of the tasks that personnel must perform for each design concept. All tasks shall be covered, including all physical, information processing, and communications tasks. A task inventory report shall be prepared IAW DI-[see draft DID in Appendix D], Sequence A\_\_\_\_ on DD Form 1423.

**3.8.4.1.3 Task Performance Requirements Analysis**

A Task Performance Requirements Analysis (TPRA) shall be performed for each function allocation alternative developed for each design concept under consideration. Performance standards shall be established for each critical task identified in the SFA that involves personnel. Critical tasks, as specified in paragraph 6.2.1 of MIL-H-46855, shall be identified during the TPRA and shall be separately listed and described. Critical tasks shall be subjected to a task analysis. In addition, other tasks specified in paragraph \_\_\_\_ shall also be analyzed. The performance standards for each critical task shall be:

- a. Stated in terms of minimum acceptable accuracy and maximum acceptable time.
- b. Derived from the system quantitative performance requirements.
- c. Directly related to the measures to be used in the evaluation of system effectiveness. These quantitative performance requirements shall subsequently be used in both system analysis and system testing.

The TPRA shall be reported IAW DI-MISC-80711, Sequence A\_\_\_\_ on DD Form 1423.

**3.8.4.1.4 Manpower, Personnel and Design Trade-off Analysis**

Where performance problems have been identified in the TPRA, the contractor shall provide a Manpower, Personnel and Design Trade-off Analysis (MPDTA) to identify alternate design concepts that maximize task and system performance levels while remaining within manpower and personnel constraints established in paragraph \_\_\_\_\_. The analysis shall address options among manpower, personnel and equipment design considerations. Factors analyzed shall include, but not be limited to personnel aptitude levels, grade levels, numbers of military occupational specialties (MOS), numbers of personnel/materiel interfaces, person

EXAMPLE - CONT'D

to person interfaces, and the work place environment. The results of the MPDTA shall be applied in equipment design decisions. The analysis shall be included in the results of LSA Task 303.2.5

**3.8.4.2 Training**

**3.8.4.2.1 Training Plan**

The contractor shall develop a training plan that meets the requirements of MIL-STD-1379C; documents training requirements; identifies actions to be accomplished by both the contractor and Government; and establishes milestones and schedules for providing institutional and noninstitutional training for operations, maintenance and support personnel. The training plan shall be IAW DI-H-7066, Sequence A\_\_\_\_ on DD Form 1423.

**3.8.4.2.2 Training Courses**

The contractor shall design, develop, and conduct an Initial System Operator Course for Government-selected personnel. Training shall include, but not be limited to, the skills and knowledge necessary to set-up, teardown, activate, checkout, operate, maintain, troubleshoot, and repair the system. The course shall teach all tasks selected as a result of the task analysis conducted by the contractor and approved by the Government.

**3.8.4.2.3 Training Devices**

The contractor shall propose and, upon approval by the procuring activity, design training devices that are based on and exhibit traceable hierarchical relationships to the operations, maintenance, and support tasks for which each individual device will train. A learning analysis that considers current Army training methodology shall be used to determine the optimum mix of training devices required, dependent upon learning difficulty and task criticality. The devices shall provide the capability to train operators in individual and collective tasks and provide impacts of combat support and other combat service support assets in a collective training environment. The training device shall be able to rate manned system performance and present that information as a level of readiness.

EXAMPLE - CONT'D

**3.8.4.3 Human Factors Engineering**

**3.8.4.3.1 General**

A human factors engineering effort shall be conducted to achieve the required system's effectiveness related to personnel performance during operation, maintenance, and support and to make economical demands upon manpower resources, skills, training, and costs.

**3.8.4.3.2 Planning and Execution**

An adequately staffed Human Factors Engineering (HFE) effort shall be dedicated to and be an integral part of the system analysis, design, and test process. An HFE program effected by personnel limited to consulting or ex post facto review roles will not suffice. Accordingly, an HFE Program shall be planned and implemented in accordance with MIL-H-46855, as applicable to the system development objectives, characteristics and constraints, with the following exceptions:

- a. Paragraph 3.1.1a - Delete first three sentences. Change seventh line to: "Each task which must be performed to accomplish allocated functions shall be analyzed to determine the human..."
- b. Paragraph 3.2.1.1 - Delete.
- c. Paragraph 3.2.1.1.1 - Delete.
- d. Paragraph 3.2.1.1.2 - Delete.
- e. Paragraph 3.2.1.1.3 - Delete.
- f. Paragraph 3.2.1.2 - Delete.
- g. Paragraph 3.2.2 - In 2nd line, delete all text following "equipment." Delete 3rd line. In 4th line, delete "other appropriate."
- h. Paragraph 3.2.2.3e - Delete.
- i. Paragraph 3.2.2.5 - In 12th and 13th lines, change "shall be reflected" to "are available for inclusion."

EXAMPLE - CONT'D

- j. Paragraph 3.4 - In 2nd line, change "shall" to "should."

The HFE plan shall be IAW DI-HFAC-80740, Sequence A \_\_\_\_ on DD Form 1423.

3.8.4.3.3 Objective

The objective of the HFE effort shall be to assure that the system design is consistent with the capabilities and limitations of the fully equipped soldier to operate, maintain, supply, and transport it in its operational environment, consistent with tactical requirements and logistical capabilities. The operational requirements specified in the ROC and system specifications shall be obtained with the soldier-in-the-loop.

3.8.4.3.4 Scope

To attain the above objective, the scope of the HFE analytic, design, and test activities shall include compensation for the effects of personal equipment; clothing; protective gear; extremes of natural environment including atmospheric, degraded visibility, thermal, and terrain conditions as defined by system requirements; workload contingencies; and combat training scenarios for each deployment mode and intended duty cycle (normal, sustained, and emergency).

3.8.4.3.5 Human Factors Engineering Program Emphasis Areas

Within the context of the above considerations, the human factors engineering program shall include, as a minimum, the following emphasis areas:

- a. Analyses. Human Factors Engineering analyses of the system shall be performed as applicable to the objectives of the contract in the areas outlined by MIL-H-46855 (as tailored) in general and the following system functions and issues in particular:
  - (1) Electronic Equipment Operation. Effectiveness of user-control/display/communication/environment integration for accomplishment of operator tasks including display legibility,

EXAMPLE - CONT'D

decision-making, fault isolation using system BITE, capability of handling high-density raids, compatibility with potential command/control/communications links, control-display dynamics of target acquisition, interrogation, ranging, IFF, etc.

- (2) Task Sequences. Capability of integrated hardware/software/personnel procedures to undertake emplacement, orientation, alignment, initialization, checkout, firing, displacement, march order, and resupply, consistent with system performance requirements.
- (3) Portability/man-transportability. Suitability of equipment loads, weight and configuration to meet portability/man-transportability requirements.
- (4) Weapon Configuration and Controls. Suitability of weapon configuration to facilitate the gunner's performance in a safe, error-free manner, consistent with specified requirements; location, configuration, and actuation characteristics of weapon controls for safe and arm, ranging, aiming, firing, etc.
- (5) NBC Environment. Capability for the system and crew to withstand an NBC contaminated environment and decontamination without losing the ability to accomplish the assigned mission.
- (6) Man Rating. Data shall be collected and analyzed to define the system's personnel environment during firings, including but not limited to noise, recoil, high velocity particles, secondary debris, exhaust products, thermal energy, and visible energy effects. In addition, the contractor shall compare measured parameters with those considered acceptable and shall provide data verifying the adequacy of any protective measures.
- (7) Maintainer Interface. Suitability of maintainer/hardware/software/procedures to facilitate the meeting of system performance requirements including accomplishing maintenance involving fault isolation, manipulation, access, removal, replacement, and repair; manual operations involving pulling, pushing, lifting, or carrying; and compatibility of tools with tasks, handwear, and environment.

EXAMPLE - CONT'D

- b. Design and Application. Human engineering applications to design shall be governed by that human performance necessary to meet or exceed system requirements as stated by the system specification and conformance to applicable provisions of MIL-H-46855. Analysis findings shall be applied to the system design.
- c. Mockups and Models. At the earliest practical point in the development program (preferably before PDR and in no case later than CDR) and well before fabrication of system prototypes, full-scale three-dimensional mockups of equipment involving critical human performance shall be constructed. The proposed Human Engineering Program Plan shall specify mockups requiring procuring activity approval and modification to reflect changes. The workmanship shall be no more elaborate than is essential to determine the adequacy of size, shape, arrangement, and panel content of the equipment for human use. The most inexpensive materials practical shall be used for fabrication. These mockups and models shall provide a basis for resolving access, workspace and related human engineering issues, and incorporating these solutions into system design. Upon approval by the procuring activity, scale models or computer aided design (CAD) techniques including an anthropometric model may be substituted for mockups. In those design areas where systems/equipment involve critical human performance and where human performance measurements are necessary, functional mockups shall be provided, subject to prior approval by the procuring activity. The mockups shall be available for inspection as specified in paragraph \_\_\_\_\_. Disposition of mockups and models after they have served the purposes of the contract, shall be as directed by the procuring activity.
- d. System Simulations. Full system simulation will be utilized to provide a means to evaluate the system design, identify soldier-machine shortfalls and concerns, resolve existing soldier-machine problems, and support the system design effort (IAW DI-HFAC-80742).

3.8.4.4 System Safety

The contractor shall conduct a system safety program (SSP) IAW Task 100, MIL-STD-882. The SSP shall integrate safety (consistent with mission requirements) into the design and qualification of the system including the Training Device System.

**EXAMPLE - CONT'D**

**3.8.4.4.1 SSP Management and Control**

The following MIL-STD-882 tasks and specific requirements are imposed to ensure adequate management and control of the SSP:

Task 101 SSP Plan IAW DI-SAFT-80100, Sequence A\_\_\_ on DD Form 1423

Task 103 System Safety Reviews. System Safety shall be an agenda item at all MANPRINT reviews (see Paragraph 3.8.6) as well as design and program reviews. A risk assessment of any unresolved deficiencies identified in the system with respect to safety shall be presented along with guidance for corrective or controlling action. Contractor shall conduct quarterly SSP Reviews (combined with quarterly technical reviews) to assess the status of compliance with the program requirements. Reviews shall include: (a) Review of program progress and compliance with major safety milestones; (b) Review of newly recognized hazards (past 120 day period) and changes in the degree of control of previously identified hazards; (c) Inventory of all identified hazards tabulated by sequence number and its status: open, closed, or monitor; (d) Status of all recommended corrective actions that have not been implemented; and (e) Significant cost and schedule changes that impact the SSP effort.

Task 104 System Safety Working Group Support

Task 105 Hazard Tracking and Risk Resolution IAW DI-SAFT-80105, Sequence A\_\_\_ on DD Form 1423

Task 106 Test and Evaluation Safety

**3.8.4.4.2 SSP Analysis, Assessment and Reports**

The following MIL-STD-882 tasks and specific requirements are imposed to ensure adequate engineering and system design:

Task 203 Subsystem Hazard Analysis IAW DI-SAFT-80101, Sequence A\_\_\_ on DD Form 1423

Task 204 System Hazard Analysis IAW DI-SAFT-80101, Sequence A\_\_\_ on DD Form 1423

Task 205 Operating and Support Hazard Analysis IAW DI-SAFT-80101, Sequence A\_\_\_ on DD Form 1423



EXAMPLE - CONT'D

Task 207 Safety Verification IAW DI-SAFT-80102, Sequence A\_\_\_\_\_ on DD Form 1423

Task 209 Safety Assessment IAW DI-SAFT-80102, Sequence A\_\_\_\_\_ on DD Form 1423

3.8.4.4.3 Surface Danger Area Determination

The contractor shall determine surface danger areas, define airspace reservation requirements, and projectile trajectories. Considerations shall include bombs, weapons and lasers. The contractor shall develop range safety recommendations.

3.8.4.4.4 Radioactive Material

The contractor shall prepare a listing of all radioactive material or items contained in the system. The list shall include the chemical composition and description, physical form, and activity of the finished item(s) in the use, maintenance, transportation and storage of the system or components thereof.

3.8.4.5 Health Hazards

The contractor shall identify all biomedical and health hazards present during the operation and support of the system hardware to include natural and induced hazardous environments and provide results at the System Safety Working Group (SSWG) meetings.

END OF EXAMPLE

3.4.1.3 MANPRINT Test and Evaluation (T&E)

This section of the SOW describes the efforts required of the contractor to measure (or predict) the *effectiveness* and *availability* of the manned system. Unfortunately, the subject of test and evaluation introduces another anomaly in MIL-HDBK-245. The normal rule for dividing program requirements between the SOW and the System Specification is, "Work statements go in the SOW;

characteristics of the hardware and software go in the System Specification". Test and evaluation seems to be an exception to that general rule in the 1983 edition of MIL-HDBK-245.

For systems in the concept development stage (Type I SOW, Figure 27), MIL-HDBK-245 makes no provision at all for test and evaluation. (Perhaps the writers thought that a system existing on paper *couldn't* be tested. With the simulation tools available today, most concepts can be evaluated, and some directly tested.)--For systems in the demonstration and validation stage (Type II SOW, Figure 27), MIL-HDBK-245 specifically provides for both a Quality Program and for testing of the prototype materiel. For systems in the full scale development stage (Type III SOW, Figure 27), MIL-HDBK-245 acknowledges contractors should conduct test and evaluation of the systems they are developing but, instead of then including generic T&E language suitable for a SOW, the handbook suggests that T&E *work statements* be placed under Paragraph 4 (Quality Assurance) in the System Specification. What is clear in this confused area is that (1) the contractor should indeed perform T&E tasks; and (2) those tasks should be fully described, but only in one place. Hence, the drafter of the MANPRINT portion of the RFP is advised to confer with the contracting officer (or other official) to determine which place is preferred.

The authors' view is that the SOW is the appropriate place for describing contractor work efforts, and that, therefore, there ought to be a MANPRINT T&E subparagraph within Paragraph 3 of the SOW. A MANPRINT T&E subparagraph is illustrated in some detail below. That paragraph is not intended to be inserted as boilerplate in an RFP, but to be tailored to the realities of the system, its stage of development, and the overall acquisition strategy. To prevent misunderstanding among the readers of the RFP, MANPRINT T&E work should be described only once. If that description occurs in the SOW, an appropriate reference to it should be made in Section 4 of the System Specification and vice versa. What appears in this handbook is both, so that the drafter may have access to an example of each. But use of only *one* is intended.

The RFP drafter who wants a better understanding of the planning and conduct of MANPRINT T&E is referred to the article entitled "The MANPRINT Metric in Testing and Evaluation" (Reference 125). Because MANPRINT's primary interest is in the *performance* of the manned system, it is usually possible to collect MANPRINT data when the manned system is being operated or maintained for any purpose. Army Regulation 602-2 requires (in paragraph 2-11) that soldier performance data be collected. Therefore, at a minimum, the RFP should direct that the contractor collect human performance data (time and accuracy) for critical operations and maintenance tasks. (Sometimes military personnel will be provided for this purpose at the contractor's plant. An alternative is to use local high school students. Another, less desirable, alternative is the use of prior military service personnel in the direct employ of the contractor.) The data can be reported using DI-HFAC-80744. In those

instances where the Army has already decided upon the metrics to be used for evaluating system effectiveness (usually an equation) and system availability, the contractor should be required to report periodically (such as at IPRs and design reviews) on the calculations of those two metrics when human performance data are included.

EXAMPLE

**3.8.5 MANPRINT Test and Evaluation**

**3.8.5.1 Soldier Performance Measurement and Advanced Soldier Performance Measurement**

Soldier Performance Measurement (SPM) shall be conducted in order to establish the degree to which required task performance is attainable and sustainable. SPM shall be designed to capture data on all tasks designated as "critical" (see paragraph 6.2.1 of MIL-H-46855) for operations, maintenance and support functions. The SPM shall require no fewer than three individuals (i.e., N=3 or more) performing (in turn) each task identified as critical. The three or more individuals selected will each be either active duty U.S. Army soldiers of the grade and MOS tentatively identified for the job to which each critical task will be assigned or, if actual soldiers are not provided to the contractor for SPM, be persons of similar age, physical characteristics and ASVAB scores. SPM shall provide a means for relating the qualitative system performance requirements to the measured soldier performance for each critical task such that variations in the quality (timeliness and accuracy) of that performance will affect the numerical value of the metric used to express system effectiveness.

The measures shall be taken after personnel have been trained and following sufficient practice at the task to have attained consistent performance.

Performance measures shall be taken under a range of environmental conditions approximating those projected for the fielded system under both daylight and night operations. These conditions shall be described. Suitable personal equipment appropriate to the tasks and projected environmental conditions shall be worn during soldier performance measurement.

The soldier performance data shall be analyzed by both time and errors. Both the frequency and cause(s) of errors shall be reported and shall be supplemented (if appropriate) by explanations from participants of the reasons for their performance errors. Effects of measured soldier performance on the metrics for system effectiveness shall be shown, and any projected decrements in system performance shall be explained. Soldier performance data shall be analyzed to determine if any of the critical tasks for operations, maintenance or

EXAMPLE - CONT'D

support is aptitude-sensitive. Soldier performance data shall be presented (1) by each ASVAB subtest score of each soldier participant and (2) by the cluster of ASVAB subtest scores used to make MOS assignments applicable to the system being developed.

Advanced Soldier Performance Measurement (ASPM) shall be performed to account for any changes to the equipment design as the development process progresses. ASPM shall be conducted using actual equipment to verify or modify information obtained from SPM using mock-ups, simulations or preliminary designs. ASPM shall occur as early as possible in the development process and not later than Full Scale Development.

SPM and ASPM shall be reported IAW DI-HFAC-80744, Sequence A\_\_\_ on DD Form 1423.

An MPTE plan shall be prepared. The plan shall describe how tests and evaluations will be conducted to measure the manpower and personnel contribution to system performance. The plan shall provide for variations in manpower and personnel parameters sufficient to assess the accuracy of the estimates made in the Task Performance Capability Analysis (if that analysis was made). The MPTE shall assess the degree to which system performance can be achieved within the preestablished personnel constraints. The MPTE test plan shall describe the equipment, mock-ups and simulations to be used, the test conditions, and personnel to be tested. The plan shall describe the nature of the data to be collected and the means of collection, recording, and analysis. Checklists, manuals and other job aids to be used shall also be described. The MPTE plan may be prepared as a separate entity or integrated into the Human Engineering Test Plan (if the latter is a contract requirement) IAW DI-HFAC-80743, Sequence A\_\_\_ on DD Form 1423.

3.8.5.2 Safety Assessment (see paragraph 3.8.4.4.2, Task 207 and Task 209)

END OF EXAMPLE

3.4.1.4 MANPRINT Reviews

This section describes the scope, timing, location and contractor responsibilities for reviews which the government will conduct of the MANPRINT program. A

planning review and one or more progress reviews are usually sufficient. The planning review should be scheduled for immediately after contract award. Requirements for this review should be written so as to assure that the government and the contractor reach a mutual understanding of the scope, content, and level of MANPRINT effort. The requirements should provide for review of organizational, personnel, and administrative matters as well as the MANPRINT technical aspects which are included and those which are not. Progress reviews may be on a periodic basis or may be keyed to significant stages or milestones in the development process. The requirements should be written so that progress in the MANPRINT program as planned can be assessed. These reviews must be timed such that needed changes, corrections or adjustments can be made in time to have an impact on materiel development. MANPRINT reviews may be limited to MANPRINT topics or may be integrated with more general reviews, as best serves the needs of the specific acquisition. Illustrative MANPRINT review requirements are contained in the example which follows.

EXAMPLE

3.8.6 MANPRINT Reviews

MANPRINT will be included as an agenda item at all design and program reviews. In addition, the following specific MANPRINT reviews shall be conducted:

- a. Program Planning. A MANPRINT program planning review at the \_\_\_\_\_, scheduled by the contractor, shall be undertaken no later than \_\_\_\_\_ DAC. The purposes of this planning meeting are to:
  - (1) Insure mutual understanding of the proposed MANPRINT program plan and program plans in specific MANPRINT domains such as the Manpower and Personnel Program Plan (see paragraph 3.8.4.1.1), training program planning (see paragraph 3.8.4.2.1), HFE program planning (see paragraph 3.8.4.3.2), and system safety (see paragraph 3.8.4.4.1, Task 101).
  - (2) Insure consistency of HFE program planning with the objectives of the contract and applicable provisions of MIL-H-46855.
  - (3) Review the tailoring of MIL-STD-1472 the contractor proposed in the HFE program plan.

EXAMPLE - CONT'D

- (4) Review general approach, assumptions, guidelines, schedule, and level of MANPRINT effort.
  - (5) Surface problems and/or needs for contractor access to technical information for requirements clarification.
- b. Progress Reviews. Two MANPRINT progress reviews shall be scheduled and conducted by the contractor. The first review shall be conducted not later than 30 days prior to the PDR. The second review, not later than 30 days prior to the CDR. Each review shall cover at least the following:
- (1) Program Accomplishments. The system MANPRINT program progress shall be described in sufficient detail to provide a clear understanding of progress, status, and future plans pursuant to implementing the approved MANPRINT program plan.
  - (2) System Integration and Interactions. Evidence shall be presented to insure that the system will work effectively with other systems with which it interfaces and that human performance requirements for such integrated operation are consistent with planned human resources.
  - (3) Principal Human Performance Requirements. System operation and maintenance requirements (e.g., reaction times, accuracy, time to repair/replace) which depend on human performance shall be summarized. Critical tasks upon which satisfactory performance and/or the system's effectiveness depends shall be identified. Review of such critical tasks shall therefore include: 1) System performance requirements, 2) critical tasks driving such performance, 3) human performance requirements of these critical tasks, 4) equipment/software involved with the critical tasks, and 5) the range of operational and environmental conditions anticipated during performance of the critical tasks.
  - (4) Human Engineering Design. Design of items having an operator, controller, or maintainer interface shall be presented in terms of compliance with human performance and human engineering design requirements.
  - (5) Manpower, Personnel and Training (MPT), Health Hazard and Safety Implications. MPT, Health Hazard and Safety implications for design and conversely, design implications for MPT, Health

EXAMPLE - CONT'D

Hazards and Safety, shall be described. Risks, if any, and planned corrective action, shall be identified. Absence of risk, if applicable, and supporting rationale, shall be stated (see paragraph 3.8.4.4.1, Task 103).

MANPRINT progress reviews shall be reported IAW DI-HFAC-80741, tailored as follows: Delete the terms "Human Engineering" and "human engineering" throughout and substitute, "MANPRINT." Sequence A\_\_\_ on DD Form 1423.

(Note: 1. Significant portions of the above example were adapted from Reference 103.,

END OF EXAMPLE

### 3.4.2 MANPRINT Inputs to the System Specification

- a. General. In most cases, the System Specification for a major Army system will have been prepared in accordance with MIL-STD-490, Specification Practices. As MIL-STD-490A is currently organized, there are six sections that comprise the system specification. MANPRINT inputs should be made for Section 2-APPLICABLE DOCUMENTS; Section 3-REQUIREMENTS; and Section 4-QUALITY ASSURANCE PROVISIONS. Inputs will be discussed in sequence in the paragraphs that follow.
- b. Specific. MANPRINT inputs should be made to the following sections:
  - (1) Section 2-AVAILABLE DOCUMENTS. In this section the writer prepares a Document Summary List (DSL) which identifies the regulatory documents that will be in effect during the course of the contract. Identification of these documents assists the contractor in understanding his contractual obligations to the Government. It further identifies any modifications to the regulations the Government is evoking. Specifically, the DSL will:
    - (a) Identify by number, revision, title and issuance date all directly cited documents
    - (b) Delineate the Document Category

- (c) Cross-reference the applicable section, paragraph and line (within the paragraph) of the solicitation contract, or contract modification
- (d) Where applicable, delineate the specific tailoring of each document

The task for the MANPRINT writer is to select the regulatory documents (e.g., Army regulations, military standards, military specifications and data item descriptions) that are the underpinning of the MANPRINT program and identify these to the contractor (See Appendix A). Failure to do this properly can provide a vendor an opportunity to avoid compliance legally. A sample DSL is provided below. In the interest of brevity, only MANPRINT entries are shown.

EXAMPLE

DOCUMENT SUMMARY LIST

The following document categories are applicable to this list:

a. Category I - The requirements contained in the directly cited documents are contractually applicable to the extent specified. Unless otherwise specified in the solicitation, contract, or contract modifications, all requirements contained in the referenced and subsequently referenced documents are contractually for guidance and information only. If not tailored, "extent specified" means the entire document.

b. Category II - The requirements contained in the directly cited documents, and the referenced documents identified within the directly cited document are contractually applicable to the extent specified. Unless otherwise specified in the solicitation, contract or contract modifications, all requirements contained in subsequently referenced documents within the referenced documents are contractually for guidance and information only.

c. Category III - Unless otherwise specified in the solicitation, contract, or contract modifications, all requirements contained in the directly cited document and all reference and subsequently referenced documents are contractually applicable to the extent specified.

d. If no Category is cited, the document is for guidance only.

e. The most current data item descriptions listed in the CDRL section of this RFP are in effect as of contract award date and will be Cat I unless otherwise stated in this document summary list.



## EXAMPLE - CONT'D

AMC Pam 602-1 (Sys-Spec 3.1)	MANPRINT Handbook for RFP Development	23 Nov 87
AMC Reg 385-100 (DI-H-1327A)	Safety Manual	1 Aug 85 Cat I
AR 40-10 (Sys Spec 3.1.4.1)	Health Hazard Assessment Program in Support of the Army Materiel Acquisition Decision Process	15 Sep 83
AR 602-1 (Sys Spec 3.1, 3.1.3, 3.1.3.1.3)	Human Factors Engineering Program	15 Feb 83
AR 602-2 (Sys Spec 3.1, 3.1.3, 3.1.3.1.3)	Manpower and Personnel Integration (MANPRINT) in Materiel Acquisition Process	17 Apr 87
MIL-STD-882B Notice 1 (Sys Spec 3.1.2.1, 3.1.2.1.3, 3.1.4.1, DI-SAFT-80100, DI-SAFT-80101, DI-SAFT-80102, DI-SAFT-80106)	Systems Safety Program Requirements	1 Jul 87 Cat I

END OF EXAMPLE

- (2) Section 3-REQUIREMENTS. This section is the "heart" of the specification and contains the essential requirements and descriptions that apply to the performance, design, reliability, personnel subsystems, etc. of the configuration item, material or

process that is the subject of the RFP. This section is intended to indicate, as definitely as practicable, the minimum requirements that the configuration item, material or process must meet to be acceptable. Each of the aforementioned requirements are discussed in turn:

- (a) Paragraph 3.2.1 Performance Characteristics. This paragraph becomes the figurative anchor for all subsequent MANPRINT input to the system specification by establishing that (1) a "manned system" is being developed and that the soldiers who will operate, maintain, and support the system have already been identified; (2) soldier performance is to be considered in calculating system performance (effectiveness and availability) and (3) there may be certain soldier performance standards which must be achievable in the fielded system. A good example of a performance specification suitable for inclusion in this paragraph is shown here:

EXAMPLE

3.2.1 Performance Characteristics

The design of the weapon system shall provide a soldier-machine interface (SMI) which allows the "ready" weapon, operated by soldiers identified in the target audience description with no more skill attainment/sustainment training than described below, to engage a stationary threat system at 1/2 maximum range of the weapon within 15 seconds after detection with 7 kilometer visibility in a benign countermeasures environment. Engagement time of 23 seconds after target identification is desired under NBC, night, and/or other adverse conditions. The hit probability ( $P_h$ ) for such an engagement shall be at least .87 when calculated by an equation/formula containing one or more specific terms describing the soldier performance of critical operations tasks.  $P_h$  of at least .71 is desired under NBC, night, and/or other adverse conditions. Until test data are available for use in this calculation, a value not to exceed .9 may be substituted for any such term.

END OF EXAMPLE

- (b) Paragraph 3.2.2 Physical Characteristics. This paragraph shall state any physical characteristics of the system hardware that are of particular concern to the MANPRINT program. Among the characteristics often covered in this paragraph are weight, size, portage (including disassembly and component handling), equipment actions and energy types and levels to be controlled, NBC provisions, ingress/egress, and access provisions. An example is:

EXAMPLE	
	Physical Characteristics
3.2.2.1	<b>Weight</b>  The system hardware which includes an antenna unit, a power unit (or interface to host vehicle power), a reviewer processor unit and a control display unit and other components required to keep the system in continuous operation for at least eight hours, shall weigh 22.5 kg or less (desired) to 30.0 kg (required/maximum).
3.2.2.2	<b>Configuration</b>  The physical shape of the hardware shall be compatible with suitably clothed and equipped user-population. The systems shape and weight shall be in conformance with paragraph 5.11 of MIL-STD-1472.
3.2.2.3	<b>Length</b>  The carry length of the largest hardware component shall not exceed 50 centimeters with 40 centimeters desired.
3.2.2.4	<b>Paints/Deterioration Control/Chemical Agents</b>  The exterior of all equipment items shall be finished IAW paragraph 3.9 of MIL-F-14072C. The final finish coat shall be a chemical agent resistant coating (CARC), Green 383 color, IAW MIL-C-46168C.

EXAMPLE - CONT'D

3.2.2.5 Portability

The hardware components shall be designed to separate into man-portable loads, each with its own back-pack for long distance carrying. Components shall have the capability for rapid movement carry. The design shall be in accordance with paragraph 5.11 of MIL-STD-1472.

END OF EXAMPLE

- (c) Paragraph 3.3.6 Safety. This paragraph shall contain the health and safety provisions applicable to the system for minimizing the risks to personnel of mechanical hazards and exposure to poisons, toxic gases, extreme temperatures, and radioactive substances. An example is:

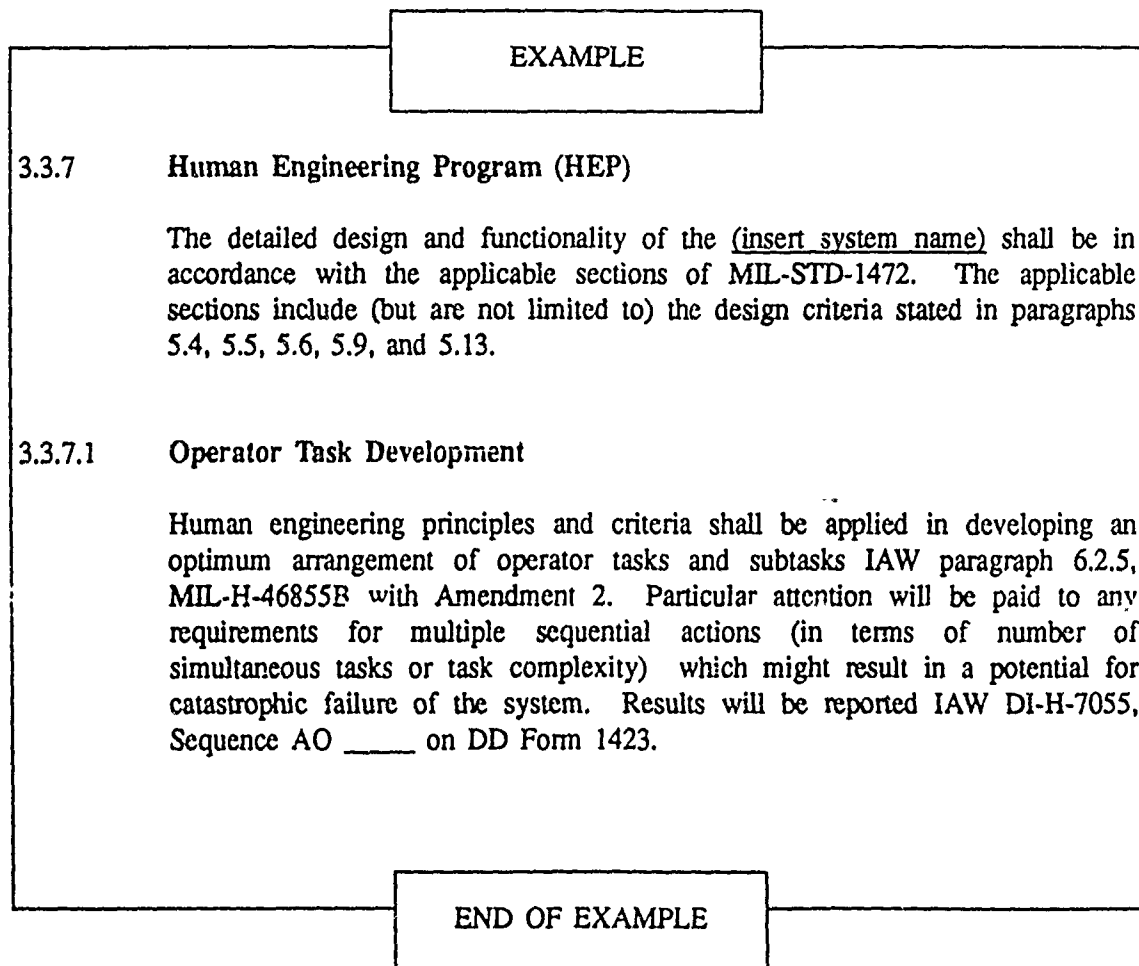
EXAMPLE

3.3.6 Biomedical, Health Hazard, and Safety Assessment

The system hardware shall incorporate safety features to protect operator and maintenance personnel, facilities, and the item itself during operation, maintenance and storage. System design shall be in conformance with the health and safety requirements of paragraph 5.13 of MIL-STD-1472 and paragraphs 5.1 and 5.2 of MIL-STD-1474 and shall incorporate sound system safety engineering principles IAW safety and health program requirements of AR 385-16, AR 40-10, and MIL-STD-882.

END OF EXAMPLE

- (d) Paragraph 3.3.7 Human Engineering Program (HEP). Human engineering requirements for the system shall be specified here and applicable documents (e.g., MIL-STD-1472) included by reference. This paragraph should also specify any special or unique requirements (e.g., constraints on allocation of functions to personnel and communications and personnel/equipment interactions). Included should be those specific areas, stations, or equipment which require concentrated human engineering attention due to the sensitivity of the operation or criticality of the task (i.e., those areas where the effects of human error would be particularly serious). An example is:



- (e) Paragraph 3.6 Manpower, Personnel, and Training. The original parameters of this paragraph have been expanded to include the manpower domain of MANPRINT. Requirements stated in this paragraph are the basis for ultimate

determination of system MPT requirements. Requirements include but are not limited to the total number of personnel that may be allocated to the system; number and types of operational crew personnel; other organizational limitations; the aptitude constraints for soldiers projected to operate, maintain, and support the system; and the maximum training burden that the Army can tolerate in operating and maintaining the system. The requirement to consider embedded training as the preferred alternative shall be explicitly stated. An example is:

EXAMPLE

3.6 Manpower, Personnel, and Training

3.6.1 Manpower

There shall be no new MOS or personnel pipeline requirements generated above current unit TOE/TDA authorizations for the system that is to be replaced. Current system requirements are as follows:

- a. MOS: MOSC 11B10, 11B20, 11B30, 11B40, and 11B50
- b. Force Structure:

Grade	Skill Level	Authorized
E3-E4	SL1	15,648
E5	SL2	4,225
E6	SL3	3,756
E7	SL4	2,034
E8-E9	SL4	1,408

3.6.1.1 Crew Size

Maximum operational crew size shall not exceed two (2) soldiers, including an operator and an assistant operator. In emergencies, the system shall be fully operable by one soldier for not less than a continuous four (4) hour period.

EXAMPLE - CONT'D

**3.6.1.2 Maintenance Tasks**

The time required for maintenance of the \_\_\_\_\_ system shall show a reduction of 20% for unit and intermediate level maintenance and 10% for higher echelons of repair when compared with the predecessor system. The steps required to complete maintenance procedures shall show a decrease of 10% for 1st through intermediate echelon and a 5% decrease for echelons above intermediate in comparison to previously-used systems.

**Personnel**

The Target Audience Description (TAD) (see Section J) lists the expected aptitude levels (ASVAB scores) of soldiers who have been identified as the likely operators and maintainers of the system hardware.

**3.6.2.1 Cognitive and Physical Requirements**

The system performance cited in paragraph 3.2.1 of this specification shall be achievable by soldiers whose ASVAB scores are in the lowest 20th percentile of the scores authorized for each MOS. They shall have a physical profile at least 111221 as defined by AR 40-501.

**3.6.2.2 Maintenance Workload**

The system hardware shall be maintainable to the degree cited in paragraph \_\_\_\_\_ of this specification by personnel holding MOS XX with OF/EL scores of 100. It is desirable that maintenance tasks be simplified so that those maintenance standards can also be achieved by personnel holding MOS XX with OF/EL scores of 85.

**3.6.3 Training**

Training programs and equipment shall permit a fully-trained gunner to perform correctly the tasks required to fire a round 95 percent of the time. A fully-trained gunner is defined as a soldier representative of the TAD who has attended an initial operator training program not to exceed 48 hours duration in order to achieve an initial

EXAMPLE - CONT'D

proficiency and who has subsequently had not less than six nor more than ten hours/quarter retraining in order to retain that initial level of proficiency. Embedded training (ET) shall be the first training alternative considered.

3.6.3.1 Training Modes

3.6.3.1.1 Institutional Training shall:

(1) qualify both initial entry and trained in-service personnel for all operator, maintainer, and support designations; (2) provide for a 25-percent student surge capability; (3) use the systematic group-paced approach in accordance with TRADOC Reg 350-17. Course outlines will be provided to the Government IAW DI-H-7069, Sequence AO \_\_\_\_\_ on DD Form 1423.

3.6.3.1.2 Non-institutional Training shall:

(1) support operator, maintainer, and support sustainment training that is task oriented for each skill level; (2) provide sustainment training to maintain operator, maintainer, and support proficiency in infrequently performed tasks, especially for low-density MOS. Sustainment training shall be based on a skill decay analysis. Report will be provided IAW DI-MISC-80711, Sequence AO \_\_\_\_\_ on DD Form 1423.

3.6.3.2 Training Device Systems

3.6.3.2.1 Training Devices

Training devices shall be based on and exhibit traceable, hierarchical relationships to the operator, maintainer, and support tasks (individual and collective) for which each individual device will train. Multiple use of a device or different devices for collective training or for instructor use shall be provided where appropriate.



EXAMPLE - CONT'D

3.6.3.2.2 Hardware Requirements

Training devices shall replicate system hardware in configuration, function, and performance to the degree of fidelity necessary to train operator, maintainer and support functions, tasks, and skills to the level of proficiency specified in government-developed evaluation criteria, (i.e., ARTEP, ATM, ITEP, STP, SQT). Devices shall produce positive training transfer. Growth potential for training equipment shall functionally match growth potential in fielded equipment. The design of training devices shall optimize cost, training, and MANPRINT effectiveness.

END OF EXAMPLE

- (3) Section 4 - QUALITY ASSURANCE PROVISIONS. In this section the government describes what test and evaluation (T&E) is to be conducted. Because the document which describes the SOW (MIL-HDBK-245) does not include T&E activities, such activities often show up here, disguised as "characteristics" of the "test" (instead of the contractor's hardware and software products). [For a fuller discussion of this issue, see Paragraph 2.4.1.3] Although that is not a desirable outcome it is a frequent one; and the MANPRINT practitioner needs to be able to respond to it. The approach recommended here is one generally followed by the other disciplines: Instead of writing "The contractor shall..." (which is clearly a work statement), instead write "The test shall. . ." (which, although a first cousin to a work statement, is arguably a characteristic of the contractor's product "test." Especially if there are no T&E provisions in the work statement, the RFP drafter needs to ensure completeness here. Where all T&E provisions of an RFP are to be located in the system specification, *not* in the SOW, an example of a MANPRINT input is shown below.

EXAMPLE

4.2 Quality Conformance Inspections

The requirements of this paragraph shall be verified IAW a contractor-prepared Government-approved test plan. (CAUTION: This statement can only be used if one is certain that the SOW and CDRL will contain requirements for an appropriate test plan.)

4.2.1 MANPRINT Test and Evaluation

The contractor's MANPRINT T&E shall be designed to forecast and, when possible, to *measure* the effect of soldier performance of critical operations and maintenance tasks on system effectiveness and availability. For quality assurance purposes, "soldier performance" is defined as that band of performance reasonably expected from the lowest 50% of the personnel described in the Target Audience Description (TAD) who, at the time of data collection, are wearing the personal clothing and equipment which are intended for the stated operational environment of the system. Estimates of soldier performance may be used if their links to the TAD, and specifically to the aptitude (ASVB) scores in the TAD, are explained. The contractor's analysis of the soldier performance data shall be in the dimensions of time and accuracy. Error rates for critical tasks shall be predicted, based upon performance data from trained personnel representative of the TAD. The contractor's data base to support MANPRINT T&E shall also be designed to include comments from the personnel from whom the performance was obtained. The method used to obtain these comments (e.g., interview, questionnaire, user jury) shall be proposed by the contractor and approved by the government prior to the test.

4.2.1.1 Impulse Noise Testing

Impulse noise testing shall be performed IAW paragraphs 5.4.2, 5.4.3, 5.4.4 and 5.5 MIL-STD-1474.

EXAMPLE - CONT'D

4.2.1.2 Communications Equipment Intelligibility Tests

The Diagnostic Rhyme Test shall be used to measure speech intelligibility for communications equipment to be used by each crew member through the audio distribution, transmitter, and receiver. The modified Rhyme Test of MIL-STD-1472, paragraph 5.3.12.6 (90 percent speech intelligibility score) shall be used to measure speech intelligibility for all internal/external communications.

END OF EXAMPLE

3.4.3 MANPRINT in the CDRL

- a. Purpose: The RFP SOW explains to the offeror what tasks need to be performed by the contractor. The CDRL on DD Form 1423 identifies for the offeror what written reports and other deliverable data the contractor will be required to submit concerning those tasks. The format and content for each such report are contained in a DID on DD Form 1664. In preparing the DD Form 1423, the goal is to limit information to that actually required for the specific procurement. Information requirements are minimized by "tailoring" the DID (i.e., lining out on the face of the DD Form 1664 those requirements which are unnecessary in this particular procurement). When tailoring is done, the tailored DD 1664 must be appended to the CDRL to show the prospective contractor what has been deleted. Reference 111, written from the human engineering point of view, is an excellent guide to the process of selecting Data Item Descriptions for an RFP and describing them correctly on a DD Form 1423.
- b. Selecting MANPRINT DIDs: Listed in Table 1 are some of the most common MANPRINT-related DIDs authorized for use in DoD acquisition programs by the AMSDL. (Changes to the AMSDL are distributed every six months. Prior to use in a solicitation, any DID should be checked against the current AMSDL.) DIDs should be selected from this list (which is not all-inclusive) based on the Army's actual need for information from the contractor, not on the content of a CDRL used in a prior procurement. Because many of the DIDs listed in Table 1 were in existence before the MANPRINT Program was announced, several individual DIDs cover more than one of the six MANPRINT areas (and

therefore appear more than once in Table 1). Such DIDs should be given priority for selection, since their use facilitates the integration of the six MANPRINT domains.

TABLE 1  
MANPRINT-Related Authorized Data Item Descriptions

A. MANPOWER

Number	Title
DI-ILSS-80077	Manpower, Personnel, and Training Analysis Report
DI-ILSS-80114	Logistic Support Analysis Record (LSAR) Data

B. PERSONNEL

Number	Title
DI-H-1300	Personnel and Training Requirements
DI-H-3253	Qualitative and Quantitative Personnel Requirements Information (QQPRI) Part I: Field and Organization Maintenance
DI-H-3254	Qualitative and Quantitative Personnel Requirements Information (QQPRI) Part II: Depot-Level Support
DI-H-7068	Task and Skill Analysis Report
DI-HFAC-80243	Personnel Planning Report
D-HFAC-80744	Human Engineering Test Report
DI-ILSS-80078	Personnel Performance Profiles
DI-ILSS-80115	LSA-015, Sequential Task Description Report

C. TRAINING

Number	Title
DI-H-1300	Personnel and Training Requirements
DI-H-3258A	Training Support Data
DI-M-6152A	Manuals, Operation and Maintenance Instruction, Maintenance Training Equipment
DI-H-7066	Training and Training Equipment Plan
DI-H-7067	Training Course Proposal
DI-H-7069	Training Course/Curriculum Outlines
DI-H-7072	Audiovisual Aids, Master Reproducibles, and Review Copies for Training Equipment and Training Courses
DI-H-7076	Instructor's Utilization Handbook for Simulation Equipment
DI-H-25718B	Trainer Functional Description Report
DI-H-25721B	Training Support Requirements Report
DI-H-25724B	Student Training Materials
DI-H-25728B	Instructor Training Course Materials
DI-H-25774B	Training Program Work Report
DI-ILSS-80047	Training Course Standards
DI-ILSS-80076	Training Program and Training Equipment Plan
DI-ILSS-80077	Manpower, Personnel, and Training Analysis Report
DI-ILSS-80084	Training Material Outline
DI-ILSS-80143	Training Plan

#### D. HUMAN FACTORS ENGINEERING

Number	Title
DI-H-7055	Critical Task Analysis Report
DI-HFAC-80740	Human Engineering Program Plan
DI-HFAC-80741	Human Engineering Progress Report
DI-HFAC-80742	Human Engineering Dynamic Simulation Plan
DI-HFAC-80743	Human Engineering Test Plan
DI-HFAC-80744	Human Engineering Test Report
DI-HFAC-80745	Human Engineering System Analysis Report
DI-HFAC-80746	Human Engineering Design Approach Document--Operator
DI-HFAC-80747	Human Engineering Design Approach Document--Maintainer

#### E. SYSTEM SAFETY

Number	Title
DI-H-1328A	Accident Prevention Safety Program
DI-H-1329A	Accident/Incident Report
DI-H-1336	Noise Measurement Report
DI-S-1838	Standard Operating Procedures for Hazardous Materials
DI-SAFT-80100	System Safety Program Plan
DI-SAFT-80101	System Safety Hazard Analysis Report
DI-SAFT-80102	Safety Assessment Report
DI-SAFT-80103	Engineering Change Proposal System Safety Report
DI-SAFT-80104	Waiver or Deviation System Safety Report
DI-SAFT-80105	System Safety Program Progress Report
DI-SAFT-80178	Manufacturing Safety Checklist

#### F. HEALTH HAZARDS

Number	Title
DI-SAFT-80106	Occupational Health Hazard Assessment Report
DI-MISC-80123	Medical and Health Plan

(Note: Appendix D contains several MANPRINT relevant draft Data Item Descriptions.)

#### 3.4.4 MANPRINT Paragraph in the Instructions to Offerors

This section of the RFP (usually Section L) will typically include a subsection on Instructions for Proposal Preparation. MANPRINT also contributes to this subsection. The following illustrative instructions are based on a major notional system:

##### EXAMPLE

- L.1 MANPRINT. The proposal shall provide a clear demonstration of how the MANPRINT program will be implemented. The offeror shall describe in detail the following:
- L.1.1 Organization: This section shall identify and describe the offeror's primary organizational element responsible for complying with MANPRINT requirements. The functions and internal structure of this element shall be defined. Structural definition shall include the number of proposed personnel on an annual basis and summary job descriptions for each person. In addition, the relationships of this element to other organizational elements responsible for areas impacted by MANPRINT, such as those charged with equipment and software design, test and evaluation, integrated logistic support and other engineering specialty programs (such as reliability, maintainability, survivability vulnerability, and transportability) shall be fully explained. The authority delegated to each of the elements shall be stated in explaining the relationships. This section shall also describe the contractors' approach to integrating each of the MANPRINT domains (Manpower, Personnel, Training, Human Factors Engineering, System Safety and Health Hazard Assessment) into system design and testing.
- L.1.2 System Analysis: This section shall identify those MANPRINT efforts in system analysis (or, where contractually required, in system engineering), which are contractually applicable and the organizational element(s) responsible for their performance. MANPRINT participation in system mission analysis, determination of system function requirements and capabilities, allocation of system functional requirements to human/hardware/software, determination of aptitude requirements for operators and maintainers, development of system functional flows and performance of system effectiveness studies shall be fully described. Any data required from the procuring activity shall be described.

EXAMPLE - CONT'D

- L.1.3      Equipment Detail Design: This section shall describe the effort in equipment detail design to ensure compliance with requirements specified by the contract. MANPRINT organization participation in studies, tests, computer aided design (CAD) evaluations, mock-up evaluations, dynamic simulation, detail drawing reviews, systems design reviews and system/equipment/component design and performance specification preparation and reviews shall be fully described.
- L.1.4      Integrated Training System Plan (ITSP): This section shall describe in detail the offeror's approach to satisfying SOW and System Specification requirements. It shall address: (1) task analysis methodology; (2) job analysis to be applied to each proposed MOS, ASI, SC, AOC, and SQI; (3) method used to identify aptitude-sensitive critical tasks; (4) method to derive instructional techniques to overcome learning difficulties; (5) skill decay analysis method used in determining type and frequency of sustainment training; (6) embedded training features and tasks trained; (7) statement of qualifications, experience, and availability of key training development/instructor personnel in job analysis, task analysis, and curriculum development; (8) plan/schedule for validation of the ITS ensuring adequate time for government verification using validated manuals prior to TT/UT; (9) milestone schedules for total ITS efforts including STP delivery.
- L.1.5      Test and Evaluation: This section shall describe MANPRINT test and evaluation as an integrated effort within the offeror's total test and evaluation program and shall contain specific information to show how and when the offeror shall satisfy test and evaluation requirements of the contract. Design milestones shall be identified at which MANPRINT tests are to be performed to assess compatibility among human performance requirements, personnel aptitude requirements, training and skill requirements, equipment design aspects of personnel equipment/software interfaces, system safety, and elimination and/or control of health hazards. This section shall also identify the MANPRINT personnel involved in test and evaluation, and summarize the MANPRINT test schedule.
- L.1.6      Program Integration: This section shall show the coordination of the MANPRINT program with ILS, RAM, and LSA activities to achieve an integrated overall effort without duplication. The plan should provide for and show how these several efforts will be supported by a common soldier performance data base and non-duplicative systems analyses.

EXAMPLE - CONT'D

This section shall include a table or matrix relating the six MANPRINT domains to system design features and to system performance. A second table or matrix specifying the testing requirements for each MANPRINT domain shall also be included.

- L.1.7 A cross index to the proposal shall be provided showing where the MANPRINT requirements are addressed.

END OF EXAMPLE

3.4.5 MANPRINT Proposal Evaluation Criteria

- a. This section of the RFP informs the offeror of the specific factors upon which the evaluation of his proposal will be based. These factors are tailored to cover what the government considers important for the attainment of specific program objectives. The following is one example of an Evaluation Factors for Award section of an RFP:

EXAMPLE

M.1 Basis for Award. Program contract award shall be based on the results of a complete Government evaluation in accordance with this section and shall be made to the offeror whose proposal is evaluated as offering the optimum approach for the attainment of program objectives considering Technical, MANPRINT, Integrated Logistic Support, Life-Cycle Cost, and Management factors.

M.2 Evaluation Approach. Proposal evaluation will be divided into five areas. In order of importance, these areas are: (1) Technical; (2) MANPRINT; (3) Integrated Logistical Support; (4) Life-Cycle Cost; and (5) Management.

END OF EXAMPLE



- b. Each major evaluation area is then subdivided into elements for a more detailed discussion of the evaluation against selected technical criteria. The MANPRINT area in the preceding example might look like this:

EXAMPLE

**M.2.2** MANPRINT (Manpower, Personnel, Training, Human Factors Engineering, System Safety, and Health Hazards Assessment). MANPRINT shall be evaluated in three stages. First, application of management criteria will focus on the offeror's initial competence in carrying out a MANPRINT program. Second, domain criteria will examine the six traditional domains separately. Finally, systems integration criteria will look at the system as a whole and examine its subsystem interactions and relations to higher-level goals.

**M.2.2.1** Management. Evaluation criteria for this element in decreasing order of importance shall be Offeror's (a) concept for incorporating MANPRINT into system design, (b) proposed MANPRINT organization, (c) concept for the MANPRINT Program Plan, (d) MANPRINT personnel, and (e) cost.

- a. Incorporating MANPRINT into System Design. The adequacy of offeror's proposed effort for assuring that the system design will reflect MANPRINT goals and constraints shall be evaluated.
- b. Proposed MANPRINT Organization. The offeror's proposed MANPRINT organization, level of effort, lines of authority, visibility to top management and potential impact on assuring MANPRINT design influence shall be evaluated.
- c. MANPRINT Program Integration. The depth and credibility of offeror's proposed effort for MANPRINT program integration based on requirements in the SOW shall be evaluated.
- d. MANPRINT Personnel. The capability of the offeror's personnel (including key subcontractor personnel) for performing the MANPRINT tasks required by the SOW shall be evaluated.
- e. Cost. The adequacy of the offeror's cost analysis in relation to MANPRINT areas outlined in the SOW shall be evaluated.

**M.2.2.2** Domains. The six MANPRINT domains, each of equal importance and each with separate criteria, shall be evaluated as follows:

EXAMPLE - CONT'D

M.2.2.2.1 Manpower. The evaluation criteria for this domain, in decreasing order of importance shall be (a) Analyses, and (b) Understanding Force Structure Concepts.

- a. Analyses. The credibility and depth of detail with which the offeror proposes to conduct trade-off and sensitivity analyses and subsequently apply the results shall be evaluated.
- b. Understanding Force Structure Concepts. The offeror's understanding of force structure constraints and ability to analyze system impact on the current force, using appropriate outputs of ECA, HARDMAN analysis and BOIP/QQPRI data shall be evaluated.

M.2.2.2.2 Personnel. The evaluation criteria for this domain in decreasing order of importance shall be (a) Responsiveness to the RFP, and (b) Analyses.

- a. Responsiveness to the RFP. The offeror's compliance with and response to the constraints and guidance provided in the SOW and the system specification shall be evaluated.
- b. Analyses. The credibility and depth of detail with which the offeror proposes to conduct trade-off and sensitivity analyses concerning soldier aptitude requirements for operations, maintenance and support tasks and subsequently to apply the results of those analyses in hardware and software design activities shall be evaluated.

M.2.2.2.3 Training. The evaluation criteria for this domain in decreasing order of importance shall be (a) Analyses and (b) Training Concepts and Implementation.

- a. Analyses. The credibility and depth of detail with which the offeror proposes to conduct trade-off and sensitivity analyses between aptitude (soldier ASVAB scores), training (time and cost), and resultant soldier performance and subsequently to apply the results of those analyses shall be evaluated. The contractor's application of trade-off analysis to save resources while maintaining unit readiness shall be evaluated.

EXAMPLE - CONT'D

- b. Training Concepts and Implementation. The contractor's ability to plan, establish and implement an Integrated Training System package to support institutional and non-institutional training shall be evaluated. Offeror's analysis of system training requirements throughout the total force using STRAP, service school surveys, task analyses, and other appropriate data shall also be evaluated.

**M.2.2.2.4 Human Factors Engineering.** The evaluation criteria for this domain in decreasing order of importance shall be (a) Human Factors Engineering in Design Effort, (b) Qualified Human Factors Personnel, (c) Responsiveness to the RFP, (d) Credibility of Proposal, and (e) Management.

- a. Human Factors Engineering in Design Effort. The adequacy of the offeror's HFE effort to assure the system design will maximize the capabilities of the soldier to operate, maintain, and support the system shall be evaluated.
- b. Qualified Human Factors Personnel. The qualifications of the offeror's personnel (including key subcontractor personnel) for performing the HFE effort required by the SOW shall be evaluated.
- c. Responsiveness to the RFP. The contractor's compliance with and response to the constraints and guidance provided in the SOW and the system specification shall be evaluated.
- d. Credibility of Proposal. The contractor's depth of planning, implementation of procedures, methods of controlling costs and level of detail shall be evaluated.
- e. Management. The contractor's approach in identifying and documenting functional and physical characteristics of the system, controlling changes, and maintaining and reporting status shall be evaluated.

**M.2.2.2.5 System Safety.** The criteria for System Safety evaluation are of equal importance and include (a) Identification of Risks and Impact, and (b) Credibility of Proposal.

- a. Identification of Risks and Impact. The contractor's approach to identify and respond to risks in system design as they relate to system safety shall be evaluated.

EXAMPLE - CONT'D

- b. Credibility of Proposal. The contractor's depth of planning and implementation of procedures shall be evaluated.

M.2.2.2.6 Health Hazard Assessment. The criteria for evaluation of this domain shall be of equal importance and shall consist of (a) Responsiveness to the RFP, and (b) Identification of Risks and Impact.

- a. Responsiveness to the RFP. The contractor's compliance with and response to constraints and guidance provided in the SOW and the system specification shall be evaluated.
- b. Identification of Risks and Impact. The contractor's approach to identify and respond to risks in system design as they relate to health hazards shall be evaluated.

M.2.2.3 System Integration. The criteria for an overall evaluation of MANPRINT in decreasing order of importance shall be (a) SMI, (b) Analyses, (c) Feedback, (d) Coordination, and (e) Data Collection.

- a. SMI. The adequacy of the contractor's procedures for integrating man and machine within the system (e.g. relating engineering decisions to soldier performance) shall be evaluated.
- b. Analyses. The contractor's approach using trade-off analysis and sensitivity analysis to consider design alternatives and identify performance measures among functional areas (e.g., MANPRINT vs. technical) shall be evaluated.
- c. Feedback. The contractor's efforts to provide feedback between system design and MANPRINT analysis, particularly early in the design phase to assist resolution of problems, shall be evaluated.
- d. Coordination. The means and procedures proposed by the contractor for coordination, sharing of data, and avoidance of duplication among ILS, RAM, and MANPRINT programs shall be evaluated.
- e. Data Collection. The contractor's procedures for data collection and analysis commonly shared by all MANPRINT domains shall be evaluated.

END OF EXAMPLE

## MANPRINT IN THE CONCEPT EXPLORATION PHASE

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This chapter contains an example of MANPRINT requirements in an RFP for a notional acquisition in the early stages of development. The notational system is called the GLADIATOR Family of Combat Vehicles (FCV). For purposes of this example assume that an approved O&O Plan and an initial SMMP exist for the FCV and that the final ROC will be prepared drawing upon data, findings and results obtained during the phase of acquisition addressed herein. The example is intended to illustrate an RFP for the Concept Exploration Phase of the traditional acquisition strategy (Figure 3), but with one significant variation. The variation is that this concept exploration acquisition involves an extension of the basic FCV scope of work (which tasked the contractors to develop comprehensive concept designs and evaluate alternative approaches for an armored force in the year 2000 and beyond) to require that contractors demonstrate their prospective design solutions through the use of analytical and physical simulations, reconfigurable interactive crew demonstrators, or mockups. This concept exploration phase will have begun with analyses (probably performed by a special task force (STF) or special study group (SSG) under the leadership of the combat developer). The studies and analyses will have identified technical approaches most likely to yield exploitable concepts. These analyses form a baseline against which alternative technical approaches and their MANPRINT implications can be developed and compared. In short, the Government's plan is to proceed from concept exploration phase to test/brass board demonstration in lieu of a validation phase. The use of this less than perfect concept exploration model expands the opportunities to illustrate MANPRINT concepts at work. This gives the reader a more extensive "menu" of MANPRINT items from which to tailor requirements appropriate to the specific materiel and phase of development of the acquisition in which he is engaged.

As in Chapter 5, the RFP example in this chapter is only a partial RFP focusing on MANPRINT activities. Some non-MANPRINT sections of the example RFP are abbreviated, while other sections routinely found in most RFP's are omitted entirely from the example. This treatment of non-MANPRINT material is deliberate. The contractions and omissions do not indicate that this material is unimportant, only that the illustrative purpose of this chapter does not require its presence. While the use of an RFP example to present MANPRINT requirements may promote understanding through concreteness and specificity it may also detract from the intended generality and flexibility of the MANPRINT material presented. It is worth repeating that the MANPRINT material in this

#### Chapter 4 - MANPRINT in the Concept Exploration Phase

handbook is intended to assist the reader in preparing MANPRINT requirements specific to a system being acquired, it is not intended as "cut and paste" material. The reader is reminded that, in any acquisition, only the minimum essential data should be ordered. This example has been somewhat "overloaded" with MANPRINT items in a deliberate attempt to provide the reader a broader selection of material for adaptation to his needs.

The reader must refer to his agency's guidance in preparing the total RFP. Even in MANPRINT matters this RFP example is not totally complete, e.g., this example contains no Section L, Instructions, Conditions and Notices to Offerors. Both Chapters 3 and 5 contain a Section L and it was felt that inclusion of a third Section L in this handbook added nothing to the substance. Similarly, Section J, List of Documents, Exhibits, and other Attachments, is not represented in this example because its presence would not contribute to the MANPRINT focus of the handbook. On the other hand, Section J is included in the example of Chapter 5 because the authors wished to make a MANPRINT point. To aid in identifying the MANPRINT incusions in both Chapters 4 and 5, a change of font has been made and is illustrated below:

This is a MANPRINT item. This font indicates a MANPRINT item in the text of the RFP.

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REPLY TO  
ATTENTION OF

### DEPARTMENT OF THE ARMY

U.S. ARMY ARMOR COMMAND  
FLEETSTONE ARSENAL, GEORGIA 30477-5411

Date

Acquisition Management  
Division

**SUBJECT:** Executive Summary - Request for Proposal (RFP), GLADIATOR  
Family of Combat Vehicles (FCV). Concept Exploration Phase,  
DAAHB05-90-R-0010.

Name  
Street  
City, State, and Zip

Dear Addressee:

The U.S. Army is pleased to solicit your proposal for the Concept Exploration Phase of the GLADIATOR FCV System.

**Objective of RFP:** The objective of the GLADIATOR FCV is to develop and field an armored force capable of defeating the threat of the 1990's and beyond timeframe, while at the same time significantly reducing the individual system's cost and the fielding and sustainment cost of the family of combat vehicles as a whole. Reduction in costs will be achieved through modularity, component commonality, and multiple system capabilities combined to achieve required effectiveness with more survivable, soldier usable, cost-effective systems. The purpose of this effort is to develop comprehensive concept designs and associated evaluations of alternative approaches in achieving the optimum balance of commonality and system/force effectiveness for the GLADIATOR vehicles.

**Description of Proposed Acquisition:** The proposed Concept Exploration will consist of a single phase acquisition requiring the completion of two (2) tasks. Task 1, Concept Development, will require development of concept designs and evaluations of the FCV and associated technical documentation. Twelve (12) months is allotted for this effort. Task 2, Concept Definition, will require further refinement of comprehensive designs developed during Task 1 and evaluation of alternative approaches in order to achieve an optimum balance of combat effectiveness and commonality for the FCV, leading to a Milestone I decision in the 4th Quarter, FY92. An additional twenty-four (24) months is envisioned for this effort. The U.S. Army Armor Command (ARMCOM) contemplates the award of up to three (3) separate contracts as the result of competitive solicitation. ARMCOM contemplates the use of a firm-fixed price "Best Effort" type of contract.

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**Government Estimate of Scientific and Technical Effort:** The Government estimates that individual contract performance will require approximately 14,000 manhours of scientific and technical effort. Because it is not possible to describe the magnitude of the proposed effort to a sufficiently definitive degree, this estimate is provided to offerors in order to elaborate on the Scope of Work, to permit optimum response from offerors, and to allow more timely and comparable evaluation of proposals by the Government. (Note: The estimate set forth above is **ADVISORY IN NATURE**, and is to be used **ONLY** as a guideline in preparing proposals--NOT as a specification which might conflict with what an offeror believes to be a meritorious technical proposal.)

**Contractor Teaming:** Teaming of vehicle developers/producers in the accomplishment of this scope of work is encouraged. This effort should be considered as a stand-alone effort in support of the concept definition phase of the FCV Program. Teams, if formed for this effort, need not be binding beyond the scope of this contract. Proper performance of all contractual requirements shall be the responsibility of the prime contractor.

**General/Informational:** All proposals received as a result of this solicitation will be evaluated by Government technical and cost personnel in accordance with the evaluation criteria set forth in Section M of this solicitation.

All offerors are subject to a Pre-Award Survey to assure that the selected firm can meet all contractual requirements, has the required financial capabilities and facilities, and is in compliance with all applicable statutes and regulations.

Because the Government desires to have the latitude, following completion of the contract effort required hereunder, to utilize the "best characteristics" from each of the competing contractors to the extent it can acquire the right to do so and it is technically feasible to so combine and integrate these characteristics, offerors are requested to:

- a. Utilize the Pre-notification of Rights in Technical Data procedure to identify items, components, processes and computer software developed at private expense and contemplated for use in contract performance.

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b. Indicate the extent to which they would be willing to enable the Government to acquire the right to unrestricted use of such data and information together with any monetary considerations required.

**Security Requirements:** This solicitation contains a DD Form 254, Contract Security Classification Specification, which sets forth the security requirements for a resulting contract requiring access to classified information. Performance of the effort required by any contract resulting from this solicitation will require access to and generation of classified technical data. Consequently, in order to be considered for award, the facility clearance of a prospective offeror must be certified as SECRET by the cognizant Government security office.

This summary is provided solely as an administrative convenience and is not intended to alter in any way the terms and conditions of the RFP. Any inconsistency between this letter and the elements of the attached RFP shall be resolved in favor of those elements in accordance with the clause entitled, "Order of Precedence", FAR 52.215-18.

Connie C. Morgan  
Contracting Officer

Enclosure

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Appendix B	Infrared/Thermal Signature Limiting Specifications (Omitted from example)
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[illegible]

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<b>INFORMATION TO OFFERORS OR QUOTERS</b> (Section A - Cover Sheet)	<b>SOLICITATION NUMBER</b> <input type="checkbox"/> ADVERTISED (IFB) <input type="checkbox"/> NEGOTIATED (RFP) <input checked="" type="checkbox"/> NEGOTIATED (RFQ)
ISSUING OFFICE (Complete mailing address including Zip Code) U.S. Army Armor Command Attn: USARM-PH-Z/MORGAN FLINTSTONE ARSENAL, GA 68477-5411	
ITEM(S) TO BE PURCHASED (Give description)  GLADIATOR Family of Combat Vehicles	
THIS PROCUREMENT IS: <input checked="" type="checkbox"/> UNRESTRICTED <input type="checkbox"/> SET-ASIDE (This is a _____ set-aside for <input type="checkbox"/> Small Business, <input type="checkbox"/> Labor Surplus Area Concerns or <input type="checkbox"/> Combined Small Business/Labor Surplus Area Concerns.) (See Section C of the Table of Contents in this solicitation for details of the set-aside.)	
<b>U.S. FIRM CONTRACTORS ONLY (SECTION B-2)</b> <p>NOTE THE AFFIRMATIVE ACTION REQUIREMENT OF THE EQUAL OPPORTUNITY CLAUSE WHICH MAY APPLY TO THE CONTRACT RESULTING FROM THIS SOLICITATION.</p> <p>You are cautioned to note the "Certification of Non-Segregated Facilities" in the solicitation. Failure to agree to the certification will render your reply nonresponsive to the terms of solicitations involving awards of contracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause.</p> <p>"Fill-ins" are provided on the face and reverse of Standard Forms 18 and 33, or other solicitation documents and Sections of Table of Contents in this solicitation and should be examined for applicability.</p> <p>See the paragraph of this solicitation entitled "Late Bids, Modifications of Bids or Withdrawal of Bids" or "Late Proposals, Modifications of Proposals and Withdrawals of Proposals".</p> <p>The envelope used in submitting your reply must be plainly marked with the Solicitation Number, as shown above and the date and local time set forth for bid opening or receipt of proposals in the solicitation document.</p> <p>If NO RESPONSE is to be submitted, detach this sheet from the solicitation, complete the information requested on reverse, fold, affix postage, and mail. NO ENVELOPE IS NECESSARY.</p> <p>Replies must set forth full, accurate, and complete information as required by this solicitation (including attachments). The penalty for making false statements is prescribed in 18 U.S.C. 1001.</p>	
ADDITIONAL INFORMATION  1. Funds are not presently available for this acquisition. No contract will be made until incrementally appropriated funds are available from which payment for contract purposes can be made.  2. See SECTION I, para I-9, for pricing data required on DD Form 1423.	
FOR INFORMATION ON THIS PROCUREMENT WRITE OR CALL	
NAME AND ADDRESS Commander U.S. Army Armor Command Attn: USARM-PH-Z/MORGAN Flintstone Arsenal, GA 68477-5411	TELEPHONE (Area Code, No. & Ext.)  (404) 576-7045
TO COLLECT CALLS	

 DD FORM 1707  
 1 MAR 76

REPLACES DD FORMS 1706 AND 1707 WHICH ARE OBSOLETE

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NO RESPONSE FOR REASONS CHECKED	
<input type="checkbox"/> CANNOT COMPLY WITH SPECIFICATIONS	<input type="checkbox"/> CANNOT MEET DELIVERY REQUIREMENT
<input type="checkbox"/> UNABLE TO IDENTIFY THE ITEM	<input type="checkbox"/> DO NOT REGULARLY MANUFACTURE OR SELL THE TYPE OF ITEMS INVOLVED
<input type="checkbox"/> OTHER (Specify)	
<input type="checkbox"/> WE DO	<input type="checkbox"/> WE DO NOT, DESIRE TO BE RETAINED ON THE MAILING LIST FOR FUTURE PROCUREMENT OF THE TYPE OF ITEMS INVOLVED
NAME AND ADDRESS OF FIRM (Include Zip Code)	
SIGNATURE	
TYPE OR PRINT NAME AND TITLE OF SIGNER	
FROM	
TO:	
101-CITATION NO. <u>DAAHB05-90-R-0010</u>	
DATE AND LOCAL TIME <u>28 NOV 1989 - 1500 HOURS</u>	
APPLY STAMP HERE	

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<b>SOLICITATION, OFFER AND AWARD</b>		1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (18 CFR 260)		PAGE 04	
2. CONTRACT NO.		3. SOLICITATION NO. DAAH805-90-R-0010		4. TYPE OF SOLICITATION <input checked="" type="checkbox"/> SEALED BID (IFB) <input checked="" type="checkbox"/> NEGOTIATED (RFP)	
5. ISSUED BY ARMPH-Z CONNIE M. MORGAN 404-576-7045 FLINTSTONE ARSENAL, GEORGIA 68477-5411		6. DATE ISSUED 6 OCT 1989		7. REQUISITION/PURCHASE NO. SEE SCHEDULE	
8. ADDRESS OFFER TO (If other than Item 5)		U.S. ARMY ARMOR COMMAND CONTRACTING DIRECTORATE (BID OPENING) FLINTSTONE ARSENAL, GEORGIA 68477-5411			

NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder".

**SOLICITATION**

9. Sealed offers in original and 3 copies for furnishing the supplies or services in the Schedule will be received at the place specified in Item 8 or if handwritten, in the discrepancy located in SEE SEC I CLAUSE - HANDCARRY OFFERS until 3:00PM local time 28 NOV 1989 (Day) (Month) (Year)

CAUTION - LATE Submissions, Modifications, and Withdrawals See Section 4, Provision No. 52.214-7 or 52.215-10. All offers are subject to all terms and conditions contained in the solicitation.

10. A. NAME  
SEE BLOCK 7 ABOVE

B. TELEPHONE NO. (Include area code) ONE COLLECT CALL  
SEE BLOCK 7 ABOVE

**11. TABLE OF CONTENTS**

W/ SEC	DESCRIPTION	PAGE(S)	W/ SEC	DESCRIPTION	PAGE(S)
<b>PART I - THE SCHEDULE</b>					
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X B	SUPPLIES OR SERVICES AND PRICES/COSTS	5	<b>PART III - LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACH</b>		
X C	DESCRIPTION/PECS/WORK STATEMENT	39	X J	LIST OF ATTACHMENTS	7
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**OFFER (Must be fully completed by offeror)**

NOTE: Item 12 does not apply if the solicitation includes the provisions at 52.214-10, Minimum Bid Acceptance Period.

12. In compliance with the above, the undersigned agrees, if this offer is accepted within \_\_\_\_\_ calendar days (60 calendar days unless a different period is inserted by the offeror) from the date for receipt of offers specified above, to furnish any or all items upon which prices are offered at the price set opposite each item, delivered at the designated point(s) within the time specified in the schedule.

13. DISCOUNT FOR PROMPT PAYMENT (See Section 2, Clause No. 52.222-2)	16. CALENDAR DAYS	18. CALENDAR DAYS	20. CALENDAR DAYS	22. CALENDAR DAYS
	%	%	%	%

14. ACKNOWLEDGMENT OF AMENDMENTS (The offeror acknowledges receipt of amendments to the SOLICITATION for offers and related documents numbered and dated)	AMENDMENT NO	DATE	AMENDMENT NO	DATE

15A. NAME AND ADDRESS OF OFFEROR	15B. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER (Type or print)

15C. TELEPHONE NO. (Include area code)	15D. CHECK IF REMITTANCE ADDRESS IS DIFFERENT FROM ABOVE - ENTER SUCH ADDRESS IN SCHEDULE	17. SIGNATURE	18. OFFER DATE

**AWARD (To be completed by Government)**

19. ACCEPTED AS TO ITEMS NUMBERED	20. AMOUNT	21. ACCOUNTING AND APPROPRIATION

22. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION: <input type="checkbox"/> 10 U.S.C. 2304(c)(1) <input type="checkbox"/> 41 U.S.C. 253(c)(1)	23. SUBMIT INVOICES TO ADDRESS SHOWN IN (6 copies unless otherwise specified)

24. ADMINISTERED BY (If other than Item 5) CODE	25. PAYMENT WILL BE MADE BY CODE

26. NAME OF CONTRACTING OFFICER (Type or print)	27. UNITED STATES OF AMERICA	28. AWARD DATE
	(Signature of Contracting Officer)	

IMPORTANT - Award will be made on this Form, or on Standard Form 28, or by other authorized official written notice.

STANDARD FORM 33 (REV. 4-89)  
Prescribed by GSA  
FAR (48 CFR) 53.214(k)

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<div style="text-align: center;"><p>ATTACHMENT 01</p><p>STATEMENT OF WORK (SOW)</p><p>DAAHB05-90-R-0010</p></div>			

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<p style="text-align: center;"><b>Statement of Work (SOW)</b></p> <p>C.1 <u>Scope of Work.</u> This Statement of Work (SOW) delineates the tasks to be accomplished by the contractor in support of the GLADIATOR FCV program. The SOW is comprised of a single phase that requires completion of two tasks described as follows:</p> <p>a. Task 1 - Concept Development. The contractor shall evaluate Government requirements and associated technical documentation concerning the FCV concept and formulate promising conceptual designs that offer excellent potential for satisfying Government requirements. Sub-tasks to be accomplished by the contractor includes: study of the background of the Government requirements and associated technical data; identification of potential FCV designs; conduct of initial analyses of promising FCV concepts; selection of the most promising FCV concept; preparation of a Level 1 drawing package; and presentation of reports and reviews to the Government for acceptance.</p> <p>b. Task 2 - Concept Definition. Upon Government acceptance of the contractor's Phase 1 concept, the contractor shall refine the designs developed during Task 1 and evaluate alternative approaches in order to achieve an optimum balance of combat effectiveness and commonality for the FCV. Sub-tasks to be accomplished include the correcting of deficiencies identified during Task 1 and the generating of data necessary to predict the performance of the contractor's designs. Prospective solutions will be demonstrated through the use of analytical and physical simulations; a reconfigurable, interactive crew demonstrator; and mock-ups.</p>			

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C.1.1	<u>Contractor Responsibilities.</u> The contractor, as an independent contractor and not an agent of the Government shall furnish facilities, supplies, and services necessary to develop comprehensive concept designs and associated evaluations for the FCV.		
C.1.2	<u>FCV Program Objective.</u> The objective of the FCV Program is to develop and field an armored force capable of defeating the threat of the year 2000 and beyond, while at the same time significantly reducing the individual systems' cost and the fielding and sustainment cost of the FCV as a whole. Reduction in costs will be achieved through modularity, component commonality, and multiple system capabilities combined so as to achieve required effectiveness with more survivable, cost-effective systems.		
C.2	<u>Applicable Documents.</u> (Note: The following is a representative example of a Document Summary Listing (DSL) and is not intended to be a complete listing. A more complete coverage of the DSL is contained in Reference 36.)		
<p style="text-align: center;">Document Summary List for Contract DAAHB05-90-R-0010 * * *</p>			
AR 602-1 (C.4.8.6)	Human Factors Engineering Program	14 Feb 83	
AR 602-2 (C.4.6.3.2f) (C.4.8.1)	Manpower and Personnel Integration (MANPRINT) in Materiel Acquisition Process	17 Apr 87	
MIL-STD-882 (C.4.8.7.1) (C.4.8.7.2)	System Safety Program Requirements	1 Jul 87 Cat I	

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MIL-STD-1472 (C.4.7.7.1d)	Human Engineering Design Criteria for Military Systems, Equipment and Facilities	14 Mar 89 Cat I	
MIL-H-46855 Amendment 2 (C.4.8.6.1)	Human Engineering Requirements for Military Systems, Equipment and Facilities	5 Apr 85 Cat I	
* * *			
C.3	<u>General Requirements.</u> The strategy for the FCV acquisition is to invite contractors to develop comprehensive concept designs and associated evaluations of alternative approaches for an armored force capable of defeating the turn of the century threat, while at the same time reducing the number of systems and force operations and systems costs. This conceptual development is to be completed during Task 1, and is expected to require twelve months. The Government contemplates the selection of the three most promising concepts for which it will award three separate contracts. During Task 2, which will require 24 months to complete, the three contractor teams will refine the designs developed during Task 1 and evaluate alternative approaches in order to achieve an optimum balance of combat effectiveness and commonality for the FCV, leading to a Milestone I decision during the 4th Quarter, FY92. The Government will conduct a competition which will be limited to the three successful contractor teams from Task 1 and from that competition will select a single contractor team that will be awarded a contract at the end of Task 2.		
C.4	<u>Detailed Requirements.</u>		

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C.4.1	<p><u>Family of Combat Vehicles.</u> The GLADIATOR FCV is defined as specified combat vehicles with some commonality of design and the armored protection normally found in Armor, Mechanized, Motorized, Light and Armored Cavalry Units. It is possible that new concepts may result in the fielding of combat and combat support vehicles not currently defined. Similarly, new concepts may well dictate radical change and may result in deletion of some current concepts and/or follow-up replacement systems. The following vehicle roles are covered under the FCV: (For further details, see Attachment 3.)</p> <ul style="list-style-type: none"> <li>a. Tank Future Armor Combat System</li> <li>b. Reconnaissance Vehicle</li> <li>c. Light Forces Assault Vehicle</li> <li>d. Infantry Fighting Vehicle</li> <li>e. Mortar Weapon System Vehicle</li> <li>f. General Purpose Carrier</li> <li>g. Long Range Anti-Tank Vehicle</li> <li>h. Self-Propelled Howitzer</li> <li>i. Target Acquisition System Vehicle</li> <li>j. Combat Observation Lasing Team Vehicle and Fire Support Vehicle</li> <li>k. Rocket/Missile Launcher Vehicle</li> <li>l. Air Defense Vehicle</li> </ul>		

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C.4.1.1	<p><u>Combined Roles.</u> The contractor may, as part of the required evaluation/assessment, combine some of the vehicle roles listed above or provide additional roles if deemed necessary.</p>		
C.4.2	<p><u>Concept of Optimum Commonality.</u> The FCV concept of optimum commonality is based on the necessity to reduce life cycle costs by streamlining the overall R&amp;D effort put into systems required for war in the twenty-first century; by reducing the numbers of unique spare parts and unique training requirements; by reducing the number of unique MOS for operator and maintenance functions; and by reducing unit costs by arranging more economic levels of hardware maintenance. The optimum degree of commonality is that level of commonality which provides minimum life cycle cost (hardware, software, and personnel) and maximum combat effectiveness of the force. There are many possible approaches to achieving commonality, some of which are shown below:</p>		
C.4.2.1	<p><u>Universal Chassis.</u> A universal chassis for the FCV. There would be a single chassis, with different mission modules for each vehicle role. The modules would be capable of being removed and replaced <i>and interchanged</i> as required.</p>		
C.4.2.2	<p><u>Multiple Chassis.</u> Multiple chassis with two or more chassis within the FCV and a different mission module for each vehicle role. The vehicle roles will determine the selection of the chassis type which will meet user requirements, life cycle costs and operational effectiveness. There could also be some commonality between chassis type.</p>		
C.4.2.3	<p><u>Variations of Chassis.</u> Variations of C.4.2.1 and C.4.2.2 above, where instead of the chassis being identical with removable mission modules, the chassis are similar with a permanent mission payload. Chassis variations within the FCV would be those necessary to accommodate mission specific equipment (i.e., upper deck, sponsons, and related hull structure; hull hydraulics; and hull electronics). Commonality within the FCV would be such items as powertrains, suspensions, and portions of the hull structure.</p>		

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C.4.2.4	<u>Commonality of Selected Components.</u> Commonality of selected components that complete vehicle configurations. Portions of, or entire assemblies of such components as the powerpack, suspension, electronics and environmental/ADC systems would be shared between as many vehicles roles as feasible.		
C.4.2.5	<u>Little or No Commonality.</u> Little or no commonality, with each vehicle optimized for its specific roles.		
C.4.2.6	<u>Other Concepts.</u> Other concepts which the contractor deems appropriate to achieve optimum balance of commonality and system/force effectiveness, and manpower utilization.		
C.4.2.7	<u>Mixtures of Chassis and Crew Capsules.</u> Commonality for mixtures of chassis and crew capsules (compartments, with standardized interfaces to chassis, which protect and sustain the entire crew for prolonged periods even in NBC-contaminated environments and from which all mission actions and operations tasks are initiated and controlled) such as: <ul style="list-style-type: none"> <li>a. Single universal chassis with a single universal crew capsule.</li> <li>b. Multiple chassis with single universal crew capsule.</li> <li>c. Single chassis with multiple crew capsules (family of capsules) where the size of the capsule is a function of the crew size, and the specific capsule selected for a weapon system is based on the required operations tasks for the weapon.</li> <li>d. Multiple chassis with multiple crew capsules, such that there is a family of capsules for each chassis or a universal family of capsules for a universal family of chassis.</li> </ul>		
C.4.3	<u>Government Production and Fielding Plan.</u> The Government's current production/fielding plan for the FCV is to utilize a test bed/brass board		

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<p>demonstration in lieu of a validation phase, followed by a Full Scale Development (FSD) program. The Government will initiate a two-year Low Rate Initial Production (LRIP) in FY98, and at full production, field a brigade per quarter or division per year. The goal will be to modernize the forces by fielding complete battalion packages. Attachment 3 illustrates the proposed acquisition schedule and assumptions and Attachment 5 shows the proposed division structure. As a variation to the Government's program schedule set forth in Attachment 3, the contractor shall address the impact of commencing the LRIP in FY96 in lieu of FY98. In addition, the contractor may develop an alternative schedule based on his own assumptions.</p>			
C.4.4	<u>Contractor Analyses.</u>		
C.4.4.1	<p><u>Life Cycle Cost Estimate.</u> The contractor shall provide a LCCE for each design concept based on the schedules and assumptions provided for the FY96 LRIP and FY98 LRIP. Along with the LCCE, the contractor shall quantify the savings anticipated from his FCV concept(s) as compared to developing, producing, fielding, and sustaining each of the FCV vehicle roles independently. The LCCE shall be in accordance with the latest versions of DCA-P-92(R) and Department of the Army Pamphlets 11-2, 11-3, and 11-4. The estimate shall cover the entire vehicle life cycle - Development, Production, Military Construction, Fielding and Sustainment. Development Activity Costs shall be split between Test Bed and FSD phases. Costs shall be presented in the B Matrix format (Table 4-1 of DCA-P-92(R)) for both phases. The Test Bed and FSD costs shall be presented in a format in which they are separately spread by year by cost element. Production, Military Construction, Fielding and Sustainment Activity Costs shall be presented in separate B Matrix and by year by cost element formats. Costs for all formats shall be in FY90 constant and current year (program) dollars. Complete supporting documentation shall include (but not be limited to): 1) all assumptions made in deriving costs, 2) the exact number of prototypes for which costs have been calculated, along with the unit prototype manufacturing cost, 3) the unit recurring production cost, along with the first unit recurring production cost and the applicable</p>		

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<p>learning curve percentage and 4) the contractor estimate of savings incurred in manpower (end strength by MOS) and training resource requirements (cost and personnel). The contractor shall develop LCCE based on the program schedules and LCCE assumptions set forth in Attachment 3. The contractor shall complete an additional LCCE based on the contractor's preferred set of assumptions and program schedules developed independently. This LCCE shall be in the same format and with the same level of supporting documentation as specified above, and shall include training resource requirements (dollars and personnel) and an estimate of any manpower savings (end-strength by MOS).</p>			
C.4.4.2	<p><u>Operational Effectiveness Analysis.</u> The contractor shall provide (via a force-on-force analysis) an assessment of the operational effectiveness of the selected FCV concepts(s) against the projected threat(s) using an equation or formula containing one or more specific terms describing soldier performance of critical operations tasks. The NATO Central Region and Middle East scenarios shall be used. Operational effectiveness attributable to technological improvements shall be contrasted to that due to commonality. An audit trail of all input and assumptions (including those concerning soldier aptitudes, training and performance) made for each vehicle in the family (to include the impact of soldier performance under normal and sustained operations), and the family as a whole shall be provided in such a form that the Government can verify the contractor's analyses and perform additional operational effectiveness analyses.</p>		
C.4.4.3	<p><u>Weight Analyses.</u> (Omitted from example).</p>		
C.4.4.4	<p><u>Commonality Benefit/Burden Analysis.</u> The contractor shall perform a commonality benefit/burden analysis on each proposed member of the GLADIATOR FCV and the FCV as a whole, describing in detail the effects of commonality on firepower, soldier performance of operations and maintenance, protection, mobility (to include swim capability), transportability, production, sustainment, and cost (to include, manpower, personnel and training costs).</p>		
C.4.5	<p><u>Contractor-Provided Lists.</u> The contractor shall provide the following lists:</p>		

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C.4.5.1	<p><u>Technologies/Components Available.</u> A listing of technologies/components available for application in the FCV and an analysis of their suitability for commonality based on development/production considerations flexibility for use throughout the single or multiple chassis FCV cost effectiveness and supportability.</p>		
C.4.5.2	<p><u>Concept Description.</u> A detailed technical description of each concept shall be provided. As a minimum it shall include vehicle characteristics (dimensions, armament, crew size and protection, mobility, internal volume, etc), transportability analysis (air, land, sea), specific performance analysis such as mobility (including swim capability), firing stability, and verification of the chassis structural integrity over all operational conditions necessary to validate the concept design and proposed physical characteristics.</p>		
C.4.6	<p><u>Design Requirements.</u> General characteristics for each of the vehicles in the FCV are set forth in Attachment 2. The characteristics shall be used for conceptualization and cost estimating only. No vehicle concept shall exceed M1A1 Gross Vehicle Weight (GVW) with the target weight being 55 tons. Powerpacks used in vehicle concepts shall at least meet the performance and configuration requirements illustrated in Attachment 4. This may require nontraditional approaches to system survivability (i.e., low obscurant technology, active protection, advanced countermeasures, etc.).</p>		
C.4.6.1	<p><u>Performance Data.</u> The contractors will generate the data required to predict the performance of their designs (<del>with the soldier-in-the-loop</del>) and will deliver that data IAW the statement of work and the attached DD Forms 1423.</p>		
C.4.6.2	<p><u>Cross Referencing Data.</u> Many of the efforts required by this contract are mutually supporting and contain specific overlaps. All documents specified as deliverables will be cross referenced to: 1) avoid extensive duplication; 2) foster consistency; 3) document applicable interfaces; 4) ease the impact of ongoing or future changes; 5) state which document contains the overriding</p>		

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<p>guidance in case of inconsistency; and 6) demonstrate an integrated approach to concept formulation and related system design.</p>			
C.4.6.3	<p><u>Concept Formulation.</u> The contractor shall refine his Best Technical Approach (BTA) based on an updated technology assessment and a complete Trade Off Determination (TOD) and Trade Off Analysis (TOA). This Best Technical Approach (BTA) shall incorporate the concept of disciplined evolution to a complete FCV through the sequential introduction of incremental FCV Packages.</p>		
C.4.6.3.1	<p><u>Technology Assessment Update.</u> The contractor shall update his technology assessment based upon revised FCV program timelines. This effort will focus on FCV technologies applicable for Concept Demonstration and Validation (CDV) during FY 90-92 and ready for transition to Full Scale Development (FSD) in FY93.</p>		
C.4.6.3.2	<p><u>Conduct TOD.</u> This updated technology assessment will be used to conduct a complete FCV TOD. This TOD will establish the bands of performance (e.g., lethality, vulnerability, rate of fire, speed, range, weight, size, signature) that can be achieved and provide information on inter-relationships such as: (1) <del>individual system and soldier performance parameters versus one another</del> (e.g., <del>range versus lethality</del>), (2) performance versus physical characteristic, and (3) performance or physical characteristics versus cost and risk. This revised TOD shall contain:</p> <ol style="list-style-type: none"> <li>Descriptions of individual subsystem technical approaches, including alternatives that use nondevelopmental items (NDI) and/or modifications to existing materiel. The description shall include the rationale for the technology selected.</li> <li>Evidence that the proposed technical approaches are engineering rather than experimental, and thus are ready for system development. The contractor shall verify the availability of their selected technologies to</li> </ol>		

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<p>meet the established program schedules (i.e., if item X is chosen, is that technology program in place (funded) or will there be a need for a new effort to develop the technology?). An estimate of the technical risks will be included.</p> <p>c. Descriptions of the trade off relationships between and within approaches.</p> <p>d. Estimates of RAM-driven O&amp;S savings.</p> <p>e. Evaluation of opportunities for improvement of supportability characteristics and requirements using MIL-STD-1388-1A, Task 202, 204, and 302 as a guide. Task 202 will be used during this phase in order to identify standard items of support, standardization of mission hardware (to include communication equipment) and software between vehicles and within each vehicle commensurate with the level of hardware design. Recommended support items for standardization, and mission hardware and software standardization efforts, shall be presented during formal program and design reviews.</p> <p>f. Assessment of MANPRINT requirements, operational effectiveness (time and accuracy), risks, impacts and potential savings in manpower, personnel and training using AR 602-2 as a guide.</p> <p>g. Recommendations for changes to FCV incremental packages based on assessed technological opportunities.</p> <p>h. Evaluation of the ability to maintain a continuity of design to accommodate incremental subsystem technologies, and the evaluation of Pre-Planned Product Improvements (P<sup>3</sup>I) to ensure that the chassis remains technologically current so as to achieve the optimum balance of combat effectiveness, commonality, and affordability for the family over time.</p>			

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<p><b>C.4.6.3.3    <u>Conduct TOA.</u></b> A complete TOA will be conducted based upon the results of the TOD. This TOA will address:</p> <ul style="list-style-type: none"> <li>a. Analysis of system trade-offs in terms of the need, operational effectiveness, required capabilities, risks, costs, schedule, strategies, manpower and personnel requirements, training burden and likely soldier performance. It is especially necessary to consider the performance of soldier operators and maintainers in early design efforts to preclude development of a performance gap. A performance gap is the inability of the manned system to achieve the system performance potential forecasted for the hardware and software alone. The analysis conducted shall lead to a system design such that technology, and not the soldier, becomes the limiting factor in achieving the desired performance.</li> <li>b. Identification of the required capabilities in terms of envelopes of system characteristics and performance, the operational concept, and the logistic support concept.</li> <li>c. Identification of risks from potential health hazards or likely system safety problems, the engineering solutions to each and an estimate of the cost of overcoming each.</li> </ul> <p><b>C.4.6.3.4    <u>Best Technical Approach (BTA).</u></b> The contractor shall incorporate the results of his revised TOD and TOA to define the best technical approach to meet the requirements defined in the O&amp;O Plan and the draft Required Operational Capability (ROC). This BTA shall be prepared IAW DI-MISC-80711 and provide the basic definition of the technical approach proposed for entry into CDV and will be in sufficient detail to serve as input to Government models. It will contain:</p> <ul style="list-style-type: none"> <li>a. A description of the approaches reviewed.</li> </ul>			

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<p>b. A description of the BTA, including the Integrated Logistic Support (ILS) Concept.</p> <p>c. Rational for the selection of the best approach.</p> <p>d. Evidence that the approach is engineering rather than experimental.</p> <p>e. Estimates of the Cost (RDTE and procurement only: (Reference Attachment 06), manpower requirements, training burden, personnel requirements, and schedule for the development and fielding of the approach.</p>			
<p>C.4.6.3.5 <u>Performance Characterization for Government Modeling.</u> FCV Concept Exploration relies heavily on analytical and physical simulation. While no operational effectiveness analysis or full compartment-level vulnerability analysis is required by this scope, the contractor shall provide the following performance data to enable the Government to conduct its own analysis: weight analysis (to level 3 WBS), and center of gravity calculations; fuel consumption (in miles per gallon) of each concept traversing cross-country, primary and secondary roads, and idle as based on the mission profiles; mobility characteristics (average speed) of each concept traversing cross-country, primary and secondary roads; and Reliability, Availability, and Maintainability (RAM) characteristics for each concept to include mean miles between failure (MMBF), mean time to repair (MTTR), and mean time between failure (MTBF) to level 3 WBS ("failure" refers to system failure). The contractor shall also provide estimates of lethality of Blue weapon systems against threat targets (specified in a document which the Government will provide to the contractor). A description of features and capabilities, the type and number of rounds, rate of fire, and round dispersion shall be provided for each weapon. Additionally, for each Blue weapon/Red target combination, the probability of hit (considering soldier aptitudes and training), probability of kill given a hit, and mm of RHA penetrated shall be provided for three aspect angles (0, 30, 90 degrees) at ranges of 1000, 2000, 3000, 5000 meters, and maximum effective range.</p>			

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C.4.7	<u>System Engineering Management</u>		
C.4.7.1	<p><u>System Engineering Management Plan.</u> The contractor will prepare a System Engineering Management Plan (SEMP) IAW DI-MISC-80711 using AMC-R 70-52 (System Engineering) dated 30 September 1986 and MIL-STD-499A (USAF), Engineering Management, as guides. The SEMP will be used to evaluate contractor's systems engineering efforts and identify system engineering tasks. The system engineering effort will be tailored to reflect the needs of the program to achieve cost effective application of system engineering. The plan shall show the interface between systems engineering and the MANPRINT specialist. The contractor's internal system engineering procedures may be used to satisfy engineering planning and output as long as they meet the intent of MIL-STD-499A (USAF) and task statements selected from Appendix A of MIL-STD-499A (USAF).</p>		
C.4.7.2	<u>Configuration Management Program.</u> (Omitted from example).		
C.4.7.3	<u>Integrated Diagnostic Approach.</u>		
C.4.7.3.1	<p><u>Integration Procedures.</u> The contractor shall develop a plan describing the procedures he intends to utilize for the development of his integrated diagnostic approach. The plan shall include, but is not limited to, the following requirements: proportion of faults detectable at all levels of maintenance using embedded and non-embedded fault detection systems; levels of fault isolation for each level of maintenance; false alarm rates and cannot duplicate rates; mean time to repair at all levels of maintenance, mixes of manual, built-in test and external diagnostics possible at levels of repair; and estimates of associated software and support costs, manpower requirements, and personnel performance requirements (e.g., the aptitude requirements of the maintenance personnel and the training (in terms of cost and time) necessary for them to achieve the needed skill level), transportation requirements, and acquisition costs; levels of</p>		

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<p>repair associated with each equipment design and test system alternative; development of unique external test systems and equipment versus the use of standard units.</p>			
C.4.7.3.2	<p><u>Supportability Design Criteria.</u> The contractor shall describe his plan to define the diagnostic approach to be provided for the maintenance of each system alternative. Methodologies shall be established to translate system mission, performance and mobility objectives into the diagnostic performance requirements. The goal is to detect and isolate all faults to a replaceable unit, with minimum of false alarms and false removals, using a mix of diagnostic capabilities built into and external to the system. The mix that comprises the diagnostic capabilities to the system shall be selected from design techniques (e.g., built-in test, fault tolerance, status monitoring, partitioning, test points), external hardware and software (e.g., automatic and manual test equipment), technical information (e.g., technical manuals, information systems and operator displays), and training (e.g., formal training, on the job training). In addition, the contractor shall identify diagnostic design feasibility issues and related designs that require prototypes and testing in the next phase to reduce risk, prove out feasibility, or demonstrate new diagnostic capabilities. The contractor shall establish the minimum acceptable level of maintenance performance that is acceptable and describe the training and practice that will be required for soldiers of known aptitudes who will operate and support the equipment. Where soldier performance of maintenance is planned, both performance times and accuracy will be estimated.</p>		
C.4.7.4	<p><u>Vehicle Design and Drawings.</u></p>		
C.4.7.4.1	<p><u>Level 1 Drawings.</u> The contractor shall provide Level 1 drawings for each vehicle in the contractor's proposed family, as required by the changes to the Phase 1 design, in 1/20 scale (1/10 if feasible). All roles described by the Government's O&amp;O Plan shall be depicted. The drawings shall include sufficient detail to depict space claims adequately, indicate functional performance, and describe major subsystems and components. The contractor</p>		

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<p>shall further refine: <b>FCV crew compartment(s)/module(s) and driver compartment/module</b>; and subassembly/module-to-vehicle interfaces. If the contractor has a Computer Aided Design/Engineering (CAD/E) system available, he shall also provide the drawings on tape in the standard Initial Graphics Exchange Specification (IGES) format. The drawings shall be prepared IAW DI-E-7031.</p> <p>C.4.7.4.2 <u>Refinement of Subassembly Designs.</u> The contractor shall refine his proposed FCV subassembly designs with special focus on <b>crew compartment(s) or module(s)</b>, driver compartment (or module), and subassembly interfaces and assembly plans.</p> <p>C.4.7.5 <u>Survivability Program.</u> (Omitted from example).</p> <p>C.4.7.6 <u>Producibility Plans.</u> (Omitted from example).</p> <p>C.4.7.6.1 <u>Producibility Reviews.</u> (Omitted from example).</p> <p>C.4.7.7 <u>Mock-up Design and Fabrication.</u> The contractor shall design and fabricate full-scale mock-ups for four mission modules and two corresponding chassis, to be specified by the Government not later than 2nd Quarter FY92.</p> <p>C.4.7.7.1 <u>Mock-up Design Requirements.</u> The mock-ups shall be designed in sufficient detail to permit evaluation of the following factors:</p> <ul style="list-style-type: none"> <li>a. Space claim of all internal equipment and provisions.</li> <li>b. Mission module/chassis interfaces.</li> <li>c. Sub-component interfaces.</li> </ul>			

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<p>d. HFE provisions with attention to simplification of crew duties, enhancement of task performance, reduction of crew fatigue, and compliance with provisions of MEL-STD-1472.</p> <p>C.4.7.7.2 <u>Mock-up Transportability.</u> The mock-ups shall be constructed in such a way as to provide ease of movement and transportation (i.e., on a wheeled stand, or with integral casters).</p> <p>C.4.8 <u>MANPRINT Program.</u></p> <p>C.4.8.1 <u>MANPRINT.</u> MANPRINT is a process of integrating the full range of Human Factors Engineering (HFE), Manpower, Personnel, and Training (MPT), Health Hazard Assessment (HHA), and System Safety (SS), throughout the material development and acquisition phases. The major objective of MANPRINT in Task 1 of this contract is to maximize total system performance at an affordable cost. The contractor shall plan and implement a program to integrate MANPRINT with concept formulation activities to ensure greatest influence on the selection of FCV design concepts. During Task 2, the concept definition effort, the contractor shall verify earlier predictions of soldier and equipment performance, force effectiveness, and affordability. The contractor shall focus on achieving the manned system performance goals stated in the system requirements documents, keeping soldier performance requirements within the limitations stated in the target audience description, and developing effective training concepts which are within the Army's maximum tolerable training burden.</p> <p>C.4.8.1.1 <u>MANPRINT Management Plans.</u> The Government-prepared FCV System MANPRINT Management Plan (SMMP) describes an overall strategy by which the Government will achieve total system performance and details relevant data sources, program concerns, milestone schedules, and task descriptions. A copy of the SMMP may be obtained from the contracting activity or as directed by the contracting officer.</p>			

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C.4.8.1.2	<p><u>Manufacturer's MANPRINT Management Plan (MMMP).</u> During Task 1, the contractor shall develop an MMMP for his FCV program to show the MANPRINT actions and coordinations which will be performed, the rationale for these activities, and the procedures for effectively integrating these activities into the larger FCV program of design and analysis. The plan shall clearly define how soldier performance (based on calculations of aptitude and training) will be assessed. The contractor shall prepare and submit the MMMP IAW DI-XXXX-0000X [See Appendix D, this handbook], Sequence A0002 on DD form 1423. The initial submission and all updates of the MMMP require Government approval and, once approved, the plan shall become the controlling document for the contractor's MANPRINT program. In Task 2, the contractor shall revise the MMMP, detailing a description of the procedures, actions, events and organization the contractor intends to employ to accomplish the MANPRINT Program to include the empirical MANPRINT data in system and subsystem design.</p>		
C.4.8.2	<p><u>Non-Duplication of Effort.</u> The contractor shall not duplicate effort in the conduct of the MANPRINT and LSA portions of this statement of work, and shall make provisions to share data and analyses between the two programs, where appropriate.</p>		
C.4.8.3	<p><u>Concept Exploration.</u> The contractor shall identify and explore concepts which are likely to impact soldier performance (as a contribution to system performance and force effectiveness). As part of this effort the contractor shall systematically examine such soldier-related commonality concepts as:</p> <ul style="list-style-type: none"> <li>a. Degree of standardization for a crew capsule, ranging from 1) complete standardization of capsule surfaces, both internal and external; through 2) a limited number of tailored, standardized openings in a standard capsule; to 3) extensive tailoring of basic capsule to support whatever unique mission packages are carried.</li> </ul>		

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<p>b. Degree of standardization for crew stations, ranging from 1) a single, 'universal' station; through 2) a limited set of standard stations; to 3) stations tailored for each specific weapon.</p> <p>c. Degree of standardization for crew-weapon and crew-environment interface mechanisms (for sensing, activations and controls), ranging from a single, minimum-essential set of standard universal interface mechanisms to an unconstrained number of highly-tailored mechanisms.</p> <p>d. Degree of duty-position standardization for commonality across systems, ranging from a limited number of standard duty positions (a standard set of operations tasks performed within a standard set of interface mechanisms) to unique tailoring of each duty position in a system. Some standard weapon duty positions could be explicitly designed to be executed satisfactorily by less-skilled soldiers (i.e., low aptitude or abbreviated training).</p> <p>e. Degree of standardization for tools and off-system diagnostic equipment, ranging from a minimum set of standard tools and devices to system-specific tools and devices.</p> <p>f. Mixtures of individual soldier encapsulation (e.g., Mission Oriented Protective Posture (MOPP)) and group protection mechanisms (e.g., sealed capsule, overpressure devices) which permit sustained soldier performance in contaminated environments. Standardization of mixtures of individual and group NBC protection mechanisms, ranging from a single universal concept (e.g., overpressure and MOPP II) to system specific concepts driven by the expected battlefield environment for the specific weapon.</p> <p>g. Degree of inter-weapon interface standardization to support resupply and medical evacuation under conditions of NBC contamination.</p>			

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C.4.8.3.1	<p><u>MANPRINT Impacts of Concepts.</u> For all FCV concepts proposed to the government, the contractor shall assess the soldier performance and soldier casualties (manpower, personnel and institutional and unit training costs) of the concepts. The contractor shall also identify any potential health and safety risks associated with the concepts explored. The contractor shall identify situations where the soldier has become a critical cost driver of proposed designs/concepts. The contractor shall deliver all analyses as part of a Human Engineering System Analysis Report (HESAR) prepared and submitted IAW DED DI-HFAC-80745, Sequence A0001 on DD Form 1423.</p>		
C.4.8.4	<p><u>Manpower and Personnel.</u></p>		
C.4.8.4.1	<p><u>Manpower Requirements Estimates.</u> Manpower requirements estimates for the proposed units (e.g., brigade, division) shall consider Army doctrine, wartime and peacetime operational concepts, equipment design, and human limitations. Wartime equipment usage rates (e.g., miles driven, rounds fired, hours operated) used to estimate wartime manpower requirements shall be derived from the appropriate Operational and Organizational (O&amp;O) Plans and any attendant mission profiles/operational mode summaries. The contractor shall identify doctrinal and/or design factors which are major drivers of the manpower requirements for proposed units. The contractor shall project the unit capability decay (e.g., mission manning shortfalls, degraded operational availability, workload backlogs) when it is manned at various levels which are less than full strength. These estimates and projections shall be reported in the contractor's format, 180 days after contract award. Five copies of the report shall be delivered.</p>		
C.4.8.4.2	<p><u>Effects of Selected FCV Concepts on Manpower Structure.</u> The contractor shall provide an analysis of the effects of the selected FCV concept(s) on the Army's manpower structure. This analysis shall include a description and explanation of the potential effects of the selected FCV concept(s) on the current Army personnel management and training systems covering (but not limited to) recruiting, career path restructuring, tour cycles, training program consolidation,</p>		

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<p>and standardization of training across systems within the FCV. This analysis and results thereof shall be reported IAW DI-MISC-80711, Sequence A0001 on DD Form 1423.</p>			
C.4.8.5	<p><u>Training Program.</u> The contractor shall prepare a training concept technical report, to be included as a separate annex to the technical reports that support the training aspects of his MANPRINT and ILS programs. This concept shall be formulated in accordance with the FCV System Training Plan (STRAP) and will focus on the embedded training approach proposed to provide improved combat readiness capability and concurrent reduction of O&amp;S costs. This report shall be IAW DI-H-7066, Sequence A0005 on DD Form 1423.</p>		
C.4.8.5.1	<p><u>Embedded Training Plan.</u> The contractor shall prepare a plan IAW DI-MISC-80711, Sequence A0006 on DD form 1423 detailing the recommended approach to realize fully the advantages of embedded training in FCV system design. This plan will describe embedded training capabilities, devices, simulations and simulators in the context of unit and institutional training concepts. Efforts described in this plan shall be coordinated with the contractor's MANPRINT and ILS/LSA efforts, and shall not be duplicative of them.</p>		
C.4.8.5.2	<p><u>Training Burden Assessment.</u> The contractor shall conduct an analysis of soldier aptitude, training and performance to determine the minimum training burden. The training burden shall be reported in terms of resource requirements, e.g., duration and costs. The results shall be reported IAW DI-MISC-80711, Sequence A0010 on DD Form 1423.</p>		
C.4.8.6	<p><u>Human Engineering.</u></p>		
C.4.8.6.1	<p><u>Planning and Execution.</u> A Human Engineering Program shall be planned and implemented IAW MIL-H-46855B as tailored for a Concept Exploration phase (Table 1, Application Matrix). Any additional tailoring deemed appropriate by the contractor shall be contained in his proposal.</p>		

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<p>C.4.8.6.2 <u>HE Data:</u></p> <ul style="list-style-type: none"> <li>a. The contractor shall prepare and submit a Human Engineering Program Plan (HEPP) IAW DID DI-HFAC-80740, Sequence A0008 on DD Form 1423. Upon approval by the Government, the contractor shall implement the HEPP accordingly.</li> <li>b. The contractor shall prepare and submit a Human Engineering Progress Report as part of the MANPRINT program update at semi-annual reviews. The report shall be prepared IAW DI-HFAC-80741, Sequence A0009 on DD Form 1423.</li> <li>c. The contractor shall prepare and deliver a HESAR IAW DID DI-HFAC-80745, Sequence A0001 on DD Form 1423. (See para. C.4.8.3.1).</li> <li>d. The contractor shall prepare and submit a Human Engineering Design Approach Document - Operator (HEDAD-O) for the systems described in paragraph C.4.7.7, IAW DI-HFAC-80746, Sequence A0003 on DD Form 1423.</li> <li>e. The contractor shall prepare and submit a Human Engineering Design Approach Document - Maintainer (HEDAD-M) for the systems described in paragraph C.4.7.7, IAW DI-HFAC-80747, Sequence A0004 on DD Form 1423.</li> </ul> <p>C.4.8.6.3 <u>Encapsulation.</u> The contractor shall identify design concepts that minimize the impact of spatial restriction and isolation of the soldier from the outside world. The contractor's design concepts will be examined for the elimination or minimizing of effects such as cramping caused by the restriction of movement, motion sickness, and reduction of soldier performance because of high interior temperature, vibration, light or noise. The contractor shall conduct an analysis</p>			

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<p>that evaluates the simplicity of design, ease of operation and commonality of maintenance as compared against contractual criteria. The report shall be in the contractor's format and the contractor shall maintain a copy of that analysis at the plant for government inspection.</p>			
C.4.8.6.4	<p><u>Minimizing the Effects of Continuous Operations (CONOPS).</u> The contractor shall consider the effects of CONOPS upon FCV design and propose concepts that minimize or at least retard soldier performance degradation. The contractor's proposed FCV design concept shall be examined for innovative ideas such as changing the characteristics of crew tasks, decreasing the number of steps in a task, or by providing performance aids that reduce cognitive loads. The contractor shall conduct an analysis that evaluates the effectiveness of the proposed design concepts as compared against contractual design criteria. The report shall be in the contractor's format and shall be maintained at the plant for government inspection upon request.</p>		
C.4.8.6.5	<p><u>Faulty Design Features.</u> Features of proposed crew station designs which contribute to fatigue or motion/simulator sickness shall be identified and design solution options presented. The proposed designs shall also provide for ease of maintenance, (providing access, simplicity, markings, warnings, durability, single point connections, and reducing special tools). Contractor proposals shall be reported as part of program and semi-annual reviews.</p>		
C.4.8.7	<p><u>System Safety Program (SSP).</u></p>		
C.4.8.7.1	<p><u>SSP Objective.</u> The contractor shall conduct a system safety program using Task 100, MIL-STD-882 as a guide. The objective of the SSP is to develop a fail-safe design wherever feasible. When a hazard cannot be eliminated, the undesirable risk must be controlled to within acceptable limits. The SSP shall integrate safety into the design and qualification of the FCV system (including the Training Device System) consistent with mission requirements. The contractor shall submit a System Safety Program Plan, IAW DI-SAFT-80100, Sequence A0025 on DD Form 1423, (Omitted from example), as an appendix</p>		

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<p>to the MMMP. In addition, the following MIL-STD-882 tasks and specific requirements are imposed to ensure adequate management and control of the SSP: TASK 103 - System Safety Reviews; TASK 104 - System Safety Working Group Support (as part of the MANPRINT Joint Working Group).</p> <p>C.4.8.7.2 <u>SSP Analysis, Assessments and Reports.</u> The following MIL-STD-882 tasks and specific requirements are imposed to ensure adequate engineering and system design: TASK 201 - Preliminary Hazard List; TASK 202 - Preliminary Hazard Analysis IAW DI-SAFT-80101, Sequence A0026 on DD Form 1423 (Omitted from example). The contractor shall provide results during the MANPRINT portion of semi-annual reviews (See para. C.4.8.9).</p> <p>C.4.8.8 <u>Biomedical and Health Hazards.</u> The contractor shall identify all biomedical and health hazards present during the operation and support of the FCV system, to include natural and induced hazardous environments, and provide results during the MANPRINT portion of semi-annual reviews. (See para. C.4.8.9)</p> <p>C.4.8.9 <u>MANPRINT Program Reviews.</u> MANPRINT Reviews shall be conducted NLT 30 days prior to the PDR and CDR. The following topics shall be addressed:</p> <ul style="list-style-type: none"> <li>a. Work accomplished and work remaining</li> <li>b. MANPRINT requirements and constraints. What has been done to meet requirements and accommodate constraints</li> <li>c. MANPRINT compliances and noncompliances</li> <li>d. Interactions among MANPRINT domains</li> <li>e. Status of data requirements.</li> </ul> <p>C.4.9 <u>Integrated Logistics Support Program (ILSP).</u></p>			

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C.4.9.1	<u>Integrated Support Plan.</u> The contractor shall prepare an Integrated Support Plan (ISP) in the format prescribed in DI-ILSS-80395. The ISP shall contain a detailed description of the procedures, actions, events and organization the contractor intends to employ to accomplish the ILS program. The contractor shall maintain the ISP in a current status and shall revise and update the plan to reflect changes emanating from program changes, reviews and other actions affecting the logistics aspects of the program. The initial submission and all updates of the ISP require Government approval, and, once approved, the plan shall be the controlling document for the contractor's ILS program.		
C.4.9.2	<u>ILS Management Team.</u> (Omitted from example).		
C.4.9.3	<u>FCV Maintenance Concept.</u> The contractor shall develop a maintenance plan for the FCV. Maintenance planning is the effort to identify, document, and establish an effective and economical way for performing maintenance. Determination of the total range and quality of maintenance tasks inherent to the system shall be accomplished to a level commensurate with system design by an iterative alignment of the FCV maintenance concept with the design's inherent maintenance characteristics.		
C.4.9.3.1	<u>Three Level Maintenance Concept.</u> The contractor shall use the three level (Organizational, Intermediate, and Depot) maintenance concept as a system baseline in the performance of maintenance planning.		
C.4.9.3.2	<u>Deficiencies or Shortcomings.</u> Any deficiencies or shortcomings in the FCV maintenance concept which could hinder the maintenance planning effort shall be identified and action by the Government to correct deficiencies and shortcomings shall be requested.		
C.4.9.4	<u>Logistic Support Analysis (LSA).</u>		

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<p>C.4.9.4.1    <u>LSA Scope.</u>    The contractor shall conduct an LSA to evaluate the effect of design alternatives for hardware and support systems and to assess the effects of various alternatives with respect to support costs and operational readiness. The LSA will also be used to assess logistic risks and to translate hardware design requirements into detailed support system requirements. The contractor shall accomplish the LSA tasks described in MIL-STD-1388-1A as indicated herein to determine the most effective and efficient means of providing logistic support to the FCV.</p> <p>C.4.9.4.2    <u>Coordination with Other Areas.</u>    The contractor shall establish an LSA program in accordance with the procedures of MIL-STD-1388-1A and the requirements contained herein. The LSA Program will be coordinated with the MANPRINT Program and other specialty areas within the context of the contractor's System Engineering effort to avoid duplication of analytical effort and ensure common usage of data. The LSA program shall be used to accomplish the ILS program tasks, to generate source data for use in the ILS element development efforts, and to integrate support plans with hardware design.</p> <p>C.4.9.4.3    <u>LSA Program Requirements</u>    The contractor shall perform an LSA Program in accordance with the procedures set forth in MIL-STD-1388-1A, Logistics Support Analysis. The following tasks/subtasks shall be performed to a level commensurate with design and operational scenario development.</p> <div style="margin-left: 40px;"> <p>Task 103    Program and Design Reviews, all subtasks, (C.4.11)</p> <p>Task 202    Mission Hardware, Software and Support System Standardization, all subtasks, (C.4.4.4)</p> <p>Task 203    Comparative Analysis, all subtasks.</p> </div>			

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<p>Task 204 Technological Opportunities, all subtasks, (C.4.5.1)</p> <p>Task 205 Supportability, and Supportability Related Design Factors, subtasks 205.2.1 through 205.2.4, (C.4.7.3.2).</p> <p>Task 301 Functional Requirements Identification, subtasks 301.2.1, .2, .3, .5, .6.</p> <p>Task 302 Support System Alternatives, subtasks 302.2.1,.2, .5 (C.4.9.4.1)</p> <p>Task 303 Evaluation of Alternatives and Tradeoff Analysis subtasks 303.2.1 through .6, and 303.2.8 through .12 (C.4.6.3.4)</p> <p>C.4.9.4.4 <u>ILS/LSA Program Review.</u> (Omitted from example).</p> <p>C.4.9.5 <u>Automation and Communication Integration.</u> (Omitted from example).</p> <p>C.4.10 <u>Quality Assurance Provisions.</u></p> <p>C.4.10.1 <u>General.</u> The contractor shall be responsible for the performance of all inspections, examinations, tests, demonstrations and analyses as specified herein. The Government reserves the right to perform any of the inspections where such inspections are deemed necessary to assure that the materials and services conform to the prescribed system performance requirements.</p> <p>C.4.10.2 <u>Manned System Testing.</u> The Government shall conduct a manned system testing program to determine the feasibility of the contractor's proposed solutions in areas such as personnel support and training requirements; and the thoroughness and completeness of the contractor's estimation of manpower and personnel requirements. For all PCV concepts proposed, the contractor shall provide his assessment of the minimum aptitude level and training burden when compared to the contractor's estimation of minimal acceptable soldier performance.</p>			

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C.4.10.3	<p><u>Quality Conformance.</u> The verification of the requirements shall be satisfied when the examinations, analyses, inspections, demonstrations and tests have been successfully completed. Verifications will be performed as shown in Table 1. Test reports shall be IAW DI-T-1906, Sequence A0007 on DD Form 1423.</p>		
C.4.10.4	<p><u>Testability Reviews.</u> The contractor shall conduct testability reviews as a part of the semi-annual reviews IAW MIL-STD-2165, Task 102, sub-task 102.2.1 and 102.2.2 a and b. The testability reviews shall address the selection and impact of alternative diagnostic concepts on readiness, life cycle cost, manpower and training. The testability reviews shall also address overall testability design constraints including but not limited to, performance monitoring, built-in test and off-line test objectives and constraints. In addition, the contractor shall make provisions for testing critical soldier performance tasks by recording the results of those tasks automatically on a 1553 data bus or other instrumentation e.g., minicam. The contractor may request separate formal testability reviews, in which case the contractor shall provide the Government thirty (30) days advance notice.</p>		

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<p align="center"><b>TABLE 1</b></p> <p align="center"><b>QUALITY CONFORMANCE VERIFICATIONS</b></p> <table border="1"> <thead> <tr> <th rowspan="2">Requirement Paragraph</th> <th rowspan="2">Title</th> <th colspan="4">Verified By</th> </tr> <tr> <th><u>Analysis</u></th> <th><u>Inspection</u></th> <th><u>Demonstration</u></th> <th><u>Test</u></th> </tr> </thead> <tbody> <tr> <td>C.4.4.1</td> <td>LCCE (Cost Savings)</td> <td align="center">X</td> <td></td> <td></td> <td></td> </tr> <tr> <td>C.4.4.2</td> <td>Operational Effectiveness</td> <td align="center">X</td> <td></td> <td></td> <td></td> </tr> <tr> <td>C.4.4.3</td> <td>Weight Analysis</td> <td align="center">X</td> <td align="center">X</td> <td></td> <td align="center">X</td> </tr> <tr> <td>C.4.4.4</td> <td>Commonality Benefit/ Burden Analysis</td> <td align="center">X</td> <td align="center">X</td> <td></td> <td></td> </tr> <tr> <td>C.4.6</td> <td>Design Requirements</td> <td align="center">X</td> <td></td> <td></td> <td></td> </tr> <tr> <td>C.4.7.1</td> <td>SEMP</td> <td align="center">X</td> <td align="center">X</td> <td></td> <td></td> </tr> <tr> <td>C.4.7.3.1</td> <td>Integration Plan</td> <td align="center">X</td> <td align="center">X</td> <td></td> <td></td> </tr> <tr> <td>C.4.7.3.2</td> <td>Supportability Design Criteria</td> <td align="center">X</td> <td align="center">X</td> <td></td> <td></td> </tr> <tr> <td>C.4.7.4.1</td> <td>Level I Drawings</td> <td></td> <td align="center">X</td> <td></td> <td></td> </tr> <tr> <td>C.4.7.7</td> <td>Mock-Ups</td> <td align="center">X</td> <td align="center">X</td> <td align="center">X</td> <td align="center">X</td> </tr> <tr> <td>C.4.8.1.2</td> <td>MMMP</td> <td align="center">X</td> <td align="center">X</td> <td></td> <td></td> </tr> <tr> <td>C.4.8.2</td> <td>Non-Duplication of Effort</td> <td></td> <td align="center">X</td> <td></td> <td></td> </tr> </tbody> </table>						Requirement Paragraph	Title	Verified By				<u>Analysis</u>	<u>Inspection</u>	<u>Demonstration</u>	<u>Test</u>	C.4.4.1	LCCE (Cost Savings)	X				C.4.4.2	Operational Effectiveness	X				C.4.4.3	Weight Analysis	X	X		X	C.4.4.4	Commonality Benefit/ Burden Analysis	X	X			C.4.6	Design Requirements	X				C.4.7.1	SEMP	X	X			C.4.7.3.1	Integration Plan	X	X			C.4.7.3.2	Supportability Design Criteria	X	X			C.4.7.4.1	Level I Drawings		X			C.4.7.7	Mock-Ups	X	X	X	X	C.4.8.1.2	MMMP	X	X			C.4.8.2	Non-Duplication of Effort		X		
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Requirement		Verified By			
<u>Paragraph</u>	<u>Title</u>	<u>Analysis</u>	<u>Inspection</u>	<u>Demonstration</u>	<u>Test</u>
C.4.8.3	Soldier-Related Commonality Concepts	X			
C.4.8.4.3	Manpower Structure	X			
C.4.8.5	Training	X			
C.4.8.5.1	Embedded Training	X	X		
C.4.8.6	HFE	X	X		X
C.4.8.7.2	Safety	X	X		
C.4.8.8	Biomedical/Health	X	X		
C.4.9.1	Integrated Support Plan		X		
C.4.9.3	Maintenance Plan	X	X		
C.4.9.4.3	LSA Program	X	X		
C.4.10.2.1	Solider Performance Requirements	X			

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<p><b>C.4.11</b>     <u>Data and Program Status Review.</u></p> <p><b>C.4.11.1</b>     <u>Program Status Reviews.</u> The contractor shall conduct three program status review meetings at ARMCOM, Flintstone Arsenal, Georgia for the FCV Task Force Director and other Government personnel. The first one shall be conducted 150 days after contract award, the second one shall be conducted 240 days after contract award and the third one shall be conducted one year after contract award. The review shall cover the contractor's technical approach and progress to date. Hard copies of the presentation materials shall be furnished to the Government at the time of the briefing IAW DI-A-3024A, Sequence A0036 on DD Form 1423 (Omitted from example). The contractor will also supply a Progress/Status Meeting Report IAW DI-A-1005A, Sequence A0037 on DD Form 1423 (Omitted from example).</p> <p><b>C.4.11.2</b>     <u>Semi-Annual Functional Area Reviews.</u></p> <p><b>C.4.11.2.1</b>     <u>Scope of Reviews.</u> Cost, MANPRINT, Producibility, ILS/LSA, Testability, Automation &amp; Communication, and Training Program status shall be presented as separate agenda items at all formal program reviews. In addition, consolidated functional area review shall be held on a semi-annual basis to review and assess each area's progress. The semi-annual reviews shall be held at times and places mutually agreeable to the Government and the contractor, normally at the contractor's site or at the same time and location of a program review. The contractor shall attend and actively participate in the proceedings. The contractor shall provide administrative support for the semi-annual reviews. The contractor shall assure participation of subcontractor personnel when necessary. The contractor shall identify and document items requiring action. These action items shall be submitted as agenda items for the semi-annual reviews. The contractor shall prepare a summary listing of open action items which identifies the organizational entity assigned responsibility for resolution and the target date for completion of each action item. Hard copies of the presentation materials shall be furnished to the Government at the time of the</p>			

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<p>presentation in accordance with the requirements of DI-A-3024A, Sequence A0038 on DD Form 1423 (Omitted from example). The contractor will also submit a Progress/Status Meeting Report in accordance with the requirements of DI-A-1005A, Sequence A0039 on DD Form 1423 (Omitted from example).</p>			
C.4.12	<u>Reports.</u>		
C.4.12.1	<p><u>Technical Reports.</u> The contractor shall deliver to the Government an interim report containing the completed cost estimates required in paragraph C.4.4.1 and Appendix C (Omitted from example). The interim report shall also contain progress/accomplishments completed to date in fulfillment of the requirements stated in the Scope of Work. The contractor shall deliver to the Government a final report containing concept designs and evaluations sufficient in detail to complete the requirements stated in the scope of Work. The technical reports shall be prepared IAW DI-MISC-80711, Sequence A0038 on DD Form 1423 (Omitted from example) and ARMCOM Technical Report Style Manual #12680. The main body of the reports shall be unclassified with the classified information contained on one separate volume (e.g.,...the vehicle is protected to the A level (see Volume X for description of protection levels)). Each plan that is included in these technical reports shall be a separate appendix to the report.</p>		
C.4.12.2	<p><u>Monthly Progress Report.</u> The contractor shall provide monthly progress reports IAW DI-MGMT-80555, Sequence A0041 on DD Form 1423 (Omitted from example).</p>		

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### **EXHIBIT A**

#### **CONTRACTS DATA REQUIREMENTS LIST**

**DAAHBO5-90-R-0010**

(Note: Several illustrative MANPRINT CDRLs are attached. This font is not used on the Form 1423s. The complete CDRL for an actual solicitation would, of course, be much longer.)

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ATTCH NR. TO EXHIBIT <u>A</u>		CONTRACT DATA REQUIREMENTS LIST				SYSTEM/TERM Family of Combat Vehicles		CONTRACTOR	
TO CONTRACT/PR		CATEGORY HFAC & MISC							
1. SOURCE NUMBER	2. TITLE OR DESCRIPTION OF DATA	3. SUBTITLE	4. AUTHORITY (Date Issue Number)	5. THEORICAL OFFICE	6. FREQUENCY	7. DATE OF 1ST SUBMISSION	8. DATE OF SUBSEQUENT SUBMISSION	9. DISTRIBUTION AND ADDRESSES (Addressed Regularly, Capabilities Only)	10. DATE
1. A0008	Human Engineering Program Plan		1. Human Engineering Program Plan	2. ARMPH-Z	11. One/R	12. See 16	13. See 16	14. ARMPH-Z ARMPH-1S ARMPH-DD ACO ARMPH-TH TOTAL 7/0	DATE
2. DI-HFAC-80740	C.4.8.6.2a			7. LT	11. A			ARMPH-Z ARMPH-1S ARMPH-DD ACO ARMPH-TH TOTAL 7/0	DATE
1. A0009	Human Engineering Progress Report		1. Human Engineering Progress Report	2. ARMPH-Z	11. See 16	12. See 16	13. See 16	14. ARMPH-Z ARMPH-1S ARMPH-DD ARMPH-IR TOTAL 4/0	DATE
2. DI-HFAC-80741	C.4.8.6.2b			7. LT	11. 0			ARMPH-Z ARMPH-1S ARMPH-DD ARMPH-IR TOTAL 4/0	DATE
1. A0010	Scientific and Technical Reports		1. Scientific and Technical Reports	2. ARMPH-Z	11. One/R	12. See 16	13. See 16	14. ARMPH-Z ARMPH-1S ARMPH-DD ACO ARMPH-TH TOTAL 7/0	DATE
2. DI-MISC-80711	C.4.8.5.2			7. LT	11. A			ARMPH-Z ARMPH-1S ARMPH-DD ACO ARMPH-TH TOTAL 7/0	DATE
1. A0011	Effects of FCV Concepts on Manpower		1. Effects of FCV Concepts on Manpower	2. ARMPH-Z	11. One Time	12. See 16	13. See 16	14. ARMPH-Z ARMPH-1S ARMPH-DD ACO ARMPH-TH TOTAL 7/0	DATE
2. DI-MISC-80711	C.4.8.4.2			7. LT	11. A			ARMPH-Z ARMPH-1S ARMPH-DD ACO ARMPH-TH TOTAL 7/0	DATE
1. A0012	Structure		1. Structure	2. ARMPH-Z	11. One Time	12. See 16	13. See 16	14. ARMPH-Z ARMPH-1S ARMPH-DD ACO ARMPH-TH TOTAL 7/0	DATE
2. DI-MISC-80711	C.4.8.4.2			7. LT	11. A			ARMPH-Z ARMPH-1S ARMPH-DD ACO ARMPH-TH TOTAL 7/0	DATE

DD FORM 1423 1 JUN 75

SUPersedes EDITION OF 1 JUN 68, WHICH WILL BE USED UNTIL EXHAUSTED

APPROVED BY DATE

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<p align="center"><b>SECTION M - EVALUATION FACTORS FOR AWARD</b></p> <p><u>Evaluation and Award Factors.</u> The awards for the FCV Concept Study will be predicated on evaluation of the proposals submitted in response to this solicitation. Recognizing that more than one technical approach may be highly acceptable, the Government contemplates the award of up to three (3) contracts resulting from this solicitation subject to the availability of funds. The Government reserves the right to make no award as a result of this solicitation if, upon evaluation of the proposals, none of the offers are deemed likely to meet the Government's technical requirements at an acceptable level of risk and/or cost.</p> <p>M.2 <u>Proposal Evaluation and Selection Process.</u></p> <p>M.2.1 <u>Government Evaluation.</u> The Government will perform a detailed technical and cost evaluation of each proposal submitted. In order to provide for proper, prompt, fair and equitable assessment of each proposal, proposal evaluation will be performed against the stated RFP requirements and in accordance with paragraph M.3, Evaluation Guidance.</p> <p>M.3 <u>Evaluation Guidance.</u></p> <p>M.3.1 <u>Selection of Successful Offeror(s).</u> Selection of successful offeror(s) shall be made based on the evaluation guidance stated below. However, any proposal which is unrealistic in terms of technical or schedule commitments or unrealistically high or low in cost will be deemed reflective of an inherent lack of technical competence or indicative of a failure to comprehend the complexity and risks of the Government's requirements as set forth in this solicitation and may be grounds for rejection of the offeror. Furthermore, any significant inconsistency between proposed performance and cost, if unexplained, may be grounds for rejection of a proposal due to an offeror's misunderstanding of the work required or his inability to perform in any resultant contract.</p> <p>M.3.2 <u>Areas, Elements and Factors.</u> The Government shall evaluate each proposal considering the area, elements and factors within elements, where applicable, depicted in EVALUATION CRITERIA, and all the information submitted in re-</p>			

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<p>sponse to this RFP. Negotiations will be conducted with only those firms who are determined to be within the competitive range based upon this Proposal Evaluation and Selection Process.</p>			
M.3.3	<p><u>Evaluation Criteria.</u> The Technical Area will be scored and the Cost Area narratively assessed. The Technical Area is significantly more important than the Cost Area, however, the balance between Technical and Cost must be such that it results in an effort the Government can afford.</p>		
M.3.3.1	<p><u>Technical Area.</u> The following elements and respective characteristics comprise the Technical Area. The response to each specific description of each element will provide the basis for proposal evaluation. Both the elements and the factors, are in relative order of importance:</p> <p><u>Element 1 - Formulation, Evaluation and Selection of FCV Concept Design(s).</u></p> <p>FACTORS: Discussion of Methodology and Approach for:</p> <ul style="list-style-type: none"> <li>a. Selection of designs.</li> <li>b. Trade-Off Analysis based on threat projections.</li> <li>c. Analysis of operational needs.</li> <li>d. Analysis of user requirements.</li> <li>e. Analysis of logistical impact.</li> <li>f. Analysis of life cycle cost impact.</li> </ul> <p><u>Element 2 - Life Cycle Cost Analysis.</u></p> <p>FACTORS: Technical approach for Life Cycle Cost Analysis as applicable to a:</p> <ul style="list-style-type: none"> <li>a. Universal chassis design, or</li> </ul>		

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<p>b. Multiple chassis design(s). (For multiple chassis, an example of each class of chassis is needed).</p> <p><u>Element 3 - Analysis of Selected Concept(s).</u></p> <p>FACTORS: Technical approach for conducting:</p> <ul style="list-style-type: none"> <li>a. Operational effectiveness analysis.</li> <li>b. Commonality benefit/burden analysis.</li> <li>c. Weight studies.</li> <li>d. Performance analysis (including best use of existing manpower and personnel resources).</li> <li>e. Training Resources Required Analysis.</li> </ul> <p><u>Element 4 - Engineering Plan.</u></p> <p>FACTORS: Discussion of technical program planning and control of offeror's system engineering efforts for executing the FCV concept study including:</p> <ul style="list-style-type: none"> <li>a. Major elements/steps of the plan.</li> <li>b. Time allotted for each step.</li> <li>c. Relationship between steps.</li> </ul> <p><u>Element 5 - MANPRINT Program.</u></p> <p>FACTORS: Discussion of technical program planning and management of offeror's MANPRINT program for executing the FCV concept including:</p> <ul style="list-style-type: none"> <li>a. Objectives, organizational responsibilities and principal activities of MANPRINT relative to the FCV program.</li> </ul>			

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<p>b. Quantification of improvement in system performance that could potentially accrue from MANPRINT-promoted efficiencies.</p> <p>c. Plans for coordination with System Engineering, and Integrated Logistics Support.</p> <p><u>Element 6 - Production and Fielding Plan.</u></p> <p>FACTORS:</p> <p>a. Discussion of methodology to be employed for meeting the Government's production/fielding plan.</p> <p>b. Discussion of the methodology to be employed by the contractor to develop production/fielding plan and the assumptions and rationale to be used to derive the plan.</p> <p>M.3.3.2 Cost Area: the offeror's cost as described in M.3.3.2.1 shall be narratively assessed.</p> <p>M.3.3.2.1 <u>Element I - Cost Realism</u></p> <p>The realism and reasonableness of costs proposed to accomplish the technical approach for meeting the contractual requirements of Section C of the RFP shall be assessed and shall include realism and reasonableness of materials, direct labor, indirect costs and other costs.</p> <p>M.3.3.2.2 <u>Element II - Cost Completeness</u></p> <p>The costs to meet the contract requirements of Section C of the RFP together with cost and pricing data must be accurate, complete and current. Examples of these costs include:</p> <p>a. <u>Materials</u> A consolidated priced summary of individual material quantities included in the various tasks being proposed, and basis for pricing (vendor quotes, invoice prices, etc.). Materials shall include</p>			

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<p style="text-align: center;">Subcontract Items, Standard Commercial Items, Inter-divisional Transfers (at other than cost), Raw Material, Purchased Parts, and Inter-divisional Transfers (at cost).</p> <p>b. <u>Direct Labor</u> Time-phased (e.g., monthly, quarterly, etc.) breakdown of labor hours, rates, and cost by appropriate category.</p> <p>c. <u>Indirect Costs</u> The method of computation and application of indirect costs, providing a basis for evaluation of the reasonableness of proposed rates.</p> <p>d. <u>Other Costs</u> A detailed listing of all other costs which are not otherwise included in the categories described above (e.g., special tooling, travel, computer and consultant services; preservation, packaging and packing; spoilage and rework) and provide basis for pricing.</p> <p>M.3.3.2.3 <u>Cost Realism</u> Cost realism is more important than completeness of cost. While cost will be evaluated for realism (that is, does the proposed cost and fee accurately reflect the offeror's proposed effort to meet program requirements) as well as completeness of cost data submitted, cost may play an additional role as follows: consideration of cost in terms of several program costs and affordability may be controlling in circumstances where two or more proposals are otherwise adjudged equal or when a technically superior proposal is at a cost which the Government cannot afford. The Government will select for contract negotiation that offeror adjudged to best meet the requirements at an affordable cost.</p> <p>M.4 <u>Determination of Responsibility.</u> It is DOD policy (FAR 9.183) that contracts will be placed only with responsible contractors, that is, those who can satisfactorily perform the necessary tasks and deliver the required items on time. Prospective offerors, in order to qualify as sources for this acquisition, must be able to demonstrate that they can meet the standards of responsibility set forth in FAR 4.104.1 and 4.104.3(B). In addition, the offeror shall demonstrate financial and management capabilities to meet the Government's requirements. Accordingly, the Government reserves the right to reject an offeror who cannot satisfy the Government's requirements as set forth in the RFP.</p>			

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M.5	<u>Sufficiency.</u> Proposals which merely offer to perform work in accordance with the RFP, or which fails to present more than a statement indicating their capability of compliance with the technical requirements without elaboration, shall be deemed to be unacceptable and shall not be considered.		

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### **ATTACHMENT 03**

#### **GLADIATOR FAMILY OF COMBAT VEHICLES (FCV)**

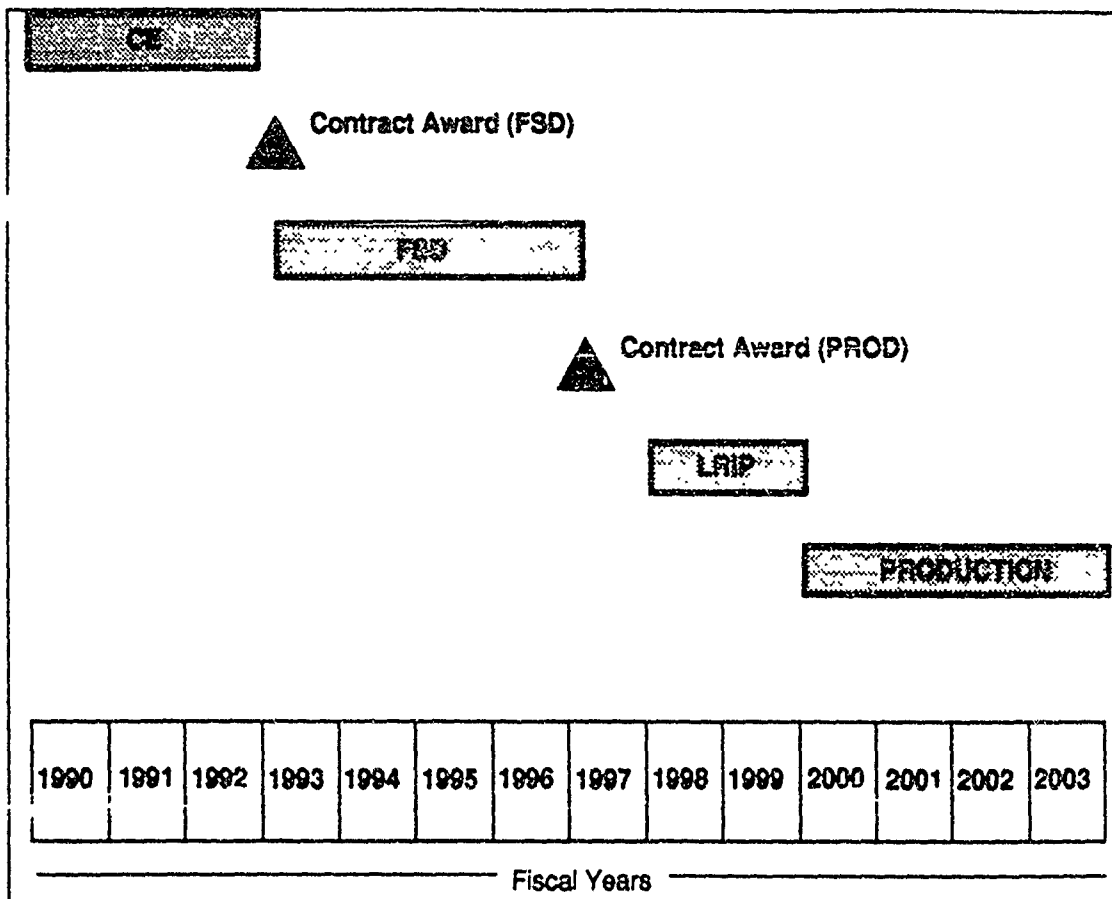
##### **PROGRAM ASSUMPTIONS AND DEFINITIONS**

1. Concept Exploration Phase is a demonstration of technologies essential to the FCV through test beds and brassboards. During this phase technologies and their associated integration requirements are prepared for the subsequent Full Scale Development. For this program the Validation Phase is eliminated.
2. During Full Scale Development the design, fabrication and testing of prototypes will occur. Both the chassis and mission modules shall undergo Technical and Operational Testing.
3. Production Lead Time is a minimum of 18 months. Any deviations from this must be justified and approved by the government.
4. Annual Vehicle Usage is 850 miles for Active Army Units and Training Vehicles; 432 miles for Reserve Units; and zero milage for POMCUS and War Reserve Vehicles.
5. No new Military Operational Specialties (MOS's) will be required. In the event the contractor proposes a new MOS, he must demonstrate a 5% reduction of total end strength and a 20% reduction in training (cost and time) over predecessor systems.
6. No increase to Army end strength will be required.
7. Overall training burden will not increase over predecessor systems.
8. Full Production is scheduled to begin in FY2000 and run through FY2003.
9. Each vehicle operates 20 years.

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## GLADIATOR FAMILY OF COMBAT VEHICLES (FCV)

### PROGRAM SCHEDULE

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### ATTACHMENT 06

#### COST REQUIREMENTS

1. The contractor shall provide development and production cost estimates on each vehicle role as well as a total for the entire vehicle family. Estimates shall be prepared in accordance with the definitions presented in DCA-P-92(R).
2. Cost shall be presented in the B Matrix format (Table 4-1 of DCA-P-92(R)). That is, total dollars for each role shall be broken out into the development and production cost categories specified in DCA-P-92(R).
3. A separate B Matrix shall be provided for production and each phase of the development program (e.g., Demonstration/Validation; Full Scale Engineering Development).
4. Costs displays shall be in FY 90 constant dollars, utilizing the latest Army inflation guidance.
5. Costs shall be prepared in accordance with the program schedule to be provided by the Government.
6. Data/Costs shall be in support of a weapons system life cycle cost estimate (i.e., not a force cost).
7. The contractor shall define his fleet structure in accordance with Appendix C (omitted from example).

For each level 3 WBS technology defined in paragraph 7, the contractor shall provide data specified on Appendix D (Omitted from example).

9. The impact of developing, producing, fielding and sustaining the contractor's fleet structure as a family (to include effects of commonality) versus the Army's current fleet structure and acquisition strategy of individual procurements, must be addressed as follows:
  - a. All DCA-P-92(R) cost elements and associated cost parameters that are impacted must be identified for the entire life cycle.
  - b. On all items identified in paragraph 9a. the delta impact (on current fleet versus the contractor's fleet structure) must be fully assessed and quantified (e.g., delta dollars, amount/% reduction, etc). Examples of areas that may be affected are training, MOS's/manpower, grade and skill requirements, maintenance, ammunition/missile requirements and protective equipment.

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10. All other benefits/costs, impacts associated with the contractor fleet structure versus the current Army fleet structure (independent of commonality/family impacts) must be identified and quantified. The relationship between any costs and any associated benefits must also be specified (e.g., dollar investment for embedded training resulted in X% reduction in training round requirements; increase in developmental dollars resulted in a technology that has a MTBF of X instead of Y; the combined effect of simplification of controls, extensive application of robotic technology and task reduction resulted in the lowering of soldier aptitude level requirements and consequentially, an LCCE savings of X dollars over the current Army system).
11. Written documentation for all cost data, element, displays shall be provided. It shall be in sufficient detail so that deviation of each cost element can be readily traced. The documentation shall include but shall not be limited to:
  - a. All assumptions made in deriving cost.
  - b. The exact number of prototypes costed.
  - c. The exact number of production units for each vehicle role and each technology.
  - d. Manpower and personnel program costed, including:
    - (1) number of military personnel by MOS and grade level for: a) operation, b) maintenance, c) support and d) training.
    - (2) number of civilian and contractor personnel for maintenance and support.
  - e. Training program costed, including:
    - (1) Factory training.
    - (2) New Equipment Training (NET).
    - (3) Training devices.
    - (4) Initial training for operation, maintenance and support.
    - (5) Sustainment training for operation, maintenance and support.
  - f. Any program/schedule information not specified in paragraph 5.
  - g. Any unit cost (e.g., first unit, average unit) and/or learning curve data used to derive development and/or production costs if different from that reported on Attachments 2 and 3.

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- h. Identification of any factors used to adjust costs.
  - i. Methodology used to derive costs.
  - j. Identification of data sources.
12. Technical descriptions of all roles and technologies shall be provided.
13. All technical parameters to be provided under the scope of work must be compatible with the WBS structure identified in the role/technology matrix (see paragraph 7) (e.g., maintenance, reliability ... at WBS level 3; manpower, usage ... at WBS level 1).
14. The relationship between each role in the Army's current fleet versus each role in the contractor's future fleet must be defined (e.g., the mission accomplished by 5 tanks in the current fleet will be performed by (which and in what quantities) 3 X FCV vehicles and 1 Y FCV vehicle.).
15. The cost requirements identified herein represent a minimum that the contractor must provide. The contractor, however, is not limited to this, but is encouraged to provide any additional/alternate information/cost data that would:
- a. Offer additional insight into benefits associated with the contractors fleet design.
  - b. Enable the Government to more fully evaluate the cost/benefits of the contractors fleet structure.

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## MANPRINT IN THE DEVELOPMENT/PROVEOUT PHASE

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This chapter provides an example of MANPRINT in an RFP for a fictitious weapon system called the ZAPPER as it enters the Development/Proveout phase of a tailored materiel acquisition strategy. For purposes of this example, assume that the O&O Plan, ROC, SMMP, TAD and TEMP have been approved. Numerous studies, analyses, tradeoffs, and materiel design decisions will have been made before reaching this phase of the acquisition.

Chapter 5 expands upon Chapter 3 by showing, through another example, how MANPRINT requirements may be selected, modified, and organized to meet the needs of this fictitious system. To illustrate how MANPRINT statements are put into the RFP, the ZAPPER has been made sufficiently complex to require some ingenuity in resolving MANPRINT issues in the system. For example, a concurrent requirement for a system training device developed by the contractor has been established. While these entries reflect the guidance of Chapter 3, they are not "cold copy" from the illustrative paragraphs of that chapter. Instead, that guidance is tailored to fit the requirements of the specific weapon. The result is an RFP example organized for development of the ZAPPER. It must be emphasized that, as in Chapter 4, this example is only a *partial RFP with a focus on MANPRINT entries*. Some non-MANPRINT sections of the RFP are abbreviated while other sections are omitted entirely. This treatment of non-MANPRINT material is deliberate. The contractions and omissions do not indicate that this material is unimportant; but simply that the illustrative purpose of this chapter does not require its presence. For instance, this example includes an abbreviated Section J, List of Documents, Exhibits, and other Attachments. From the MANPRINT point of view, the important content is limited to several MANPRINT relevant attachments. This is to emphasize the point that in several of the MANPRINT domains, requirements cannot always be expressed adequately by invoking existing specifications and standards appropriate for reference in an RFP. The current practice in RFP writing is to invoke other existing documentation in support of the requirement and, in those instances, to include the documents as attachments to the RFP, listing them as such in Section J. The Section J is included in this example to remind the reader of this important point. However, to save space, the documents themselves are omitted from the example even though they would be part of a real-world RFP. On the other hand, this example contains no Document Summary List (DSL). The omission is based on two considerations. First, the DSL is a routine and general section of an RFP of which the list of MANPRINT

## Chapter 5 - MANPRINT in the Development/Proveout Phase

documents is but a small part. This has already been exemplified in Chapter 4. Second, the list would merely duplicate selected documents from Appendix A of the handbook. Nevertheless, it is essential that all documents cited in the MANPRINT requirements of an RFP be listed in the DSL of the real-world RFP.

Finally, while this chapter is intended specifically as a model for MANPRINT requirements in the Development/Proveout phase of a materiel acquisition program, many of its parts (particularly the language used to require integration of the six MANPRINT domains with one another and all of MANPRINT with other specialty programs) are also appropriate for use in RFPs in other phases of the acquisition cycle as well as in other acquisition strategies. To promote this expanded utility, more than minimal MANPRINT requirements have been incorporated into this example. The purpose is to enrich the MANPRINT examples available to the reader even though the price may be a less "realistic" example RFP. To aid in identifying the MANPRINT inclusions, in the RFP, a change of font has been made and is illustrated below:

This is a MANPRINT item. This font indicates a MANPRINT item in the text of the RFP.

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**DEPARTMENT OF THE ARMY**  
U.S. ARMY BALLISTICS COMMAND  
FLINTSTONE ARSENAL, GEORGIA 30477-5411

REPLY TO  
ATTENTION OF

Date

Acquisition Management  
Division

**SUBJECT:** Executive Summary - Request for Proposal (RFP), ZAPPER Anti-Armor  
Weapon System, Development/Proveout Phase, DAAHB02-90-R-0014

Name  
Street  
City, State, and Zip

Dear Addressee:

The Army is pleased to solicit your proposal for the Development/Proveout phase of the ZAPPER Anti-Armor Weapon System.

**Description:** The ZAPPER is to be a man-portable, anti-armor weapon system designed to be highly effective against advanced armor concepts expected to be fielded against U.S. and Allied forces in the mid-1990s. The weapon is envisioned as a simple-to-operate, easily and economically maintained, rugged and reliable infantry system. The Army will give consideration to candidates whose guidance and warhead components are modular in design and may subsequently be improved, through increased accuracy and warhead penetration capability within the specified size and weight.

**Acquisition Strategy:** The principal strategy for the ZAPPER Program is to emphasize competition in every phase of the program. Contractors will be required to complete all component and prototype flight testing in 26 months. It is planned to issue a RFP for the Production Phase and "Not-To-Exceed" options for the first two years of Low Rate Initial Production (LRIP) approximately 22 months after award of the Development/Proveout contract.

**Work to be Accomplished:** Each contractor is expected to conduct the management and engineering required to design, fabricate, and test prototypes of a ZAPPER weapon. Warhead testing will be conducted to demonstrate that the weapon will defeat range targets representing the threat armor (as described in Attachment 03). Flight tests (a minimum of 24) will be conducted under varied conditions to demonstrate system range capability, hardness to practical countermeasures, and to obtain data to support terminal aimpoint distribution, system accuracy when fired by a gunner with the characteristics stated in the

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Target Audience Description (TAD), performance boundaries, and system survivability. The contractor is expected, as an absolute minimum, to demonstrate successful engagement of five (5) of the first nine (9) flight profiles listed in the RFP Statement of Work (SOW) paragraph 3.2.1.2.1. The successful engagement must include profiles one (1) through three (3). Target acquisition and tracking testing will be conducted to demonstrate the robustness of performance against aerosols, weather, and other system-peculiar countermeasures. Slug firings will be conducted to demonstrate the capability to launch from the specified enclosures.

Logistics Support Analysis (LSA) will be conducted to evaluate system design and support alternatives, and document the supportability requirements of the selected design.

### Evaluation of Proposal:

- a. The underlying thrust of this solicitation, and the basis for weighing each of the evaluation factors in Section M, is to select candidate(s) for the Development/Proveout Phase that give the trained infantry soldier, in the combat environment, the highest likelihood of defeating the postulated threat, at least risk, and with the best potential for subsequent Preplanned Product Improvement (P<sup>3</sup>I) in penetration capability and accuracy, within the specified size and weight.
- b. The cost evaluation will consider projected total system life-cycle cost based upon design to operations and support cost (DTOSC) and O&S costs including manpower and personnel (recruiting and retention) costs, both institutional and unit training burdens (time and cost), and intermediate and depot maintenance. Selection of the system to enter the Production and Deployment Phase will be based upon system effectiveness, system survivability, and life-cycle cost. Offerors should be aware that proposal evaluation will be based upon examination of such factors as:
  - (1) Probability of kill in manned firings.
  - (2) Manpower and Personnel Integration (MANPRINT) factors, such as ease and simplicity of operation, soldier performance contribution to probability of kill; total system manpower requirements, personnel aptitude requirements; and the institutional (skill attainment) and unit (skill sustainment) training burdens for operation, maintenance, and support.

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(3) Weapon durability, ease of maintenance, and hardening to countermeasures.

(4) Survivability.

The desired outcome of this phase is to select the one best candidate that achieves the above and best shows the feasibility and plausibility of achieving the requisite performance in the succeeding Production Phase.

c. The evaluation will be based on four areas: Technical and Operational Suitability, MANPRINT, Cost, and Management. Technical and Operational Suitability will be weighted heaviest. MANPRINT and cost are separate, equal major evaluation factors and are important for their design implications. Management will be the least heavily weighted factor.

(1) The strongest emphasis will be given to the Technical and Operational Suitability area, including Integrated Logistic Support (ILS), with the factors (described in Section M of the RFP) chosen to discriminate clearly among concepts.

(2) MANPRINT will be important because of the high likelihood of a significant soldier contribution to the error budget of the system and because of the desire to obtain the best trade-off among aptitude, training burden, and field performance of the system.

(3) Life-Cycle Cost will be a major evaluation factor; hence, offerors should propose inherently cost-effective designs.

(4) Management will be the least heavily weighted factor, and will assess the offerors' organizational structure, system engineering, configuration, and design-to-cost management, as well as past performance in on-time delivery of quality products, and transitioning from Development/Proveout to Production.

### Summary of ZAPPER Requirements:

a. The ZAPPER hardware, which includes one round, the command and launch unit (CLU), a carry bag if required, and any other components required to engage a target and perform surveillance for at least four consecutive hours shall:

(1) have a total hardware component weight of not more than 19 kg (required). A total weight of 14.5 kg or less is desired.

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- (2) have a carry length of no greater than 120 cm.
  - (3) be compatible (with adaption devices/techniques to be developed as part of the ZAPPER Systems) with storage racks on the Bradley Fighting Vehicle; (BFV), the High Mobility Multipurpose Wheel Vehicle (HMMWV), and the U.S. Marine Corps Light Armored Vehicle (LAV).
  - (4) have an employment time (from unassembled carrying mode) of  $\leq 1.5$  minutes and a rate of fire of four rounds per three minutes.
  - (5) have a design that minimizes soldier aptitude requirements and minimizes institutional and unit training time.
  - (6) have a capability to fire from enclosures (38.5 cu. meters with 2.5 sq. meters of openings) safely.
  - (7) have a CLU mean time between operational mission failure of not less than 130 hours.
  - (8) be designed for ease of maintenance.
  - (9) have an add-on remote launch capability (desired) from a distance of at least 50 meters with additional weight not greater than 12 kg.
  - (10) be designed to minimize the potential health hazards to the user and maintainer from sources such as acoustical energy (impulse noise/blast overpressure), chemical substances (combustion products from weapon firing), and radiated energy (heat/visible flash).
- b. All these requirements must be integrated in the total system performance envelope.
7. This executive summary is provided as an administrative convenience and is not intended in any way to alter the terms and conditions of the RFP.

John S. Kinder  
Contracting Officer

Enclosure

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### **SECTION A**

#### **SOLICITATION/CONTRACT FORM**

**DAAHBO2-90-R-0014**

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<b>INFORMATION TO OFFERORS OR QUOTERS</b> (Section A Cover Sheet)	<b>SOLICITATION NUMBER</b> <input type="checkbox"/> ADVERTISED (IFB) <input checked="" type="checkbox"/> NEGOTIATED (RFP) <input type="checkbox"/> NEGOTIATED (RFO)
ISSUING OFFICE: Complete mailing address including Zip Code U.S. Army Ballistics Command ATTN: USABC-PC-AD/Stonewall Flintstone Arsenal, GA 68477-5411	
ITEM(s) TO BE PURCHASED (Brief description) ZAPPER Anti-Armor Weapon System	
THIS PROCUREMENT IS: <input checked="" type="checkbox"/> UNRESTRICTED * <input type="checkbox"/> SET-ASIDE (This is a _____% set-aside for <input type="checkbox"/> Small Business, <input type="checkbox"/> Labor Surplus Area Concerns or <input type="checkbox"/> Combined Small Business/Labor Surplus Area Concerns.) (See Section C of the Table of Contents in this solicitation for details of the set-aside.) <b>*U.S. PRIME CONTRACTORS ONLY (SECTION H-8)</b>	
NOTE THE AFFIRMATIVE ACTION REQUIREMENT OF THE EQUAL OPPORTUNITY CLAUSE WHICH MAY APPLY TO THE CONTRACT RESULTING FROM THIS SOLICITATION. You are cautioned to note the "Certification of Non-Segregated Facilities" in the solicitation. Failure to agree to the certification will render your reply nonresponsive to the terms of solicitations involving awards of contracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause. "Fill-ins" are provided on the face and reverse of Standard Forms 15 and 33, or other solicitation documents and Sections of Table of Contents in this solicitation and should be examined for applicability. See the paragraph of this solicitation entitled "Late Bids, Modifications of Bids or Withdrawal of Bids" or "Late Proposals, Modifications of Proposals and Withdrawals of Proposals". The envelope used in submitting your reply must be plainly marked with the Solicitation Number, as shown above and the date and local time set forth for bid opening or receipt of proposals in the solicitation document. If NO RESPONSE is to be submitted, detach this sheet from the solicitation, complete the information requested on reverse, fold, affix postage, and mail. NO ENVELOPE IS NECESSARY. Replies must set forth full, accurate, and complete information as required by this solicitation (including attachments). The penalty for making false statements is prescribed in 18 U.S.C. 1001.	
ADDITIONAL INFORMATION Funds are not presently available for this acquisition. No contract will be made until incrementally appropriated funds are available from which payment for contract purposes can be made.	
FOR INFORMATION ON THIS PROCUREMENT WRITE OR CALL.	
NAME AND ADDRESS Commander U.S. Army Ballistics Command, ATTN: USABC-PC-AD/Stonewall Flintstone Arsenal, GA 68477-5411	TELEPHONE (Area Code, No. & Ext.) (404) 943-1066 <div style="text-align: right; border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">             NO COLLECT CALLS           </div>

DD FORM 1707  
1-21-76

REPLACES DD FORMS 1706 AND 1707 WHICH ARE OBSOLETE

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<b>SOLICITATION, OFFER AND AWARD</b>		1 THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 350)		PAYING JA-90		PAGE OF 1	
E. CONTRACT NO.		J. SOLICITATION NO. DAAHB02-90-R-0014		K. TYPE OF SOLICITATION <input checked="" type="checkbox"/> SEALED BID (IFB) <input checked="" type="checkbox"/> NEGOTIATED (RFP)		L. DATE ISSUED 4 Jan 90	
7. ISSUED BY U.S. Army Ballistics Command ATTN: USABC-PC-AD/H. Stonewall Flintstone Arsenal, GA 68477-5411		CODE		M. ADDRESS OFFER TO (If other than Item 7)		N. ACQUISITION/PURCHASE NO.	
NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder".							
<b>SOLICITATION</b>							
9. Sealed offers in original and 5 copies for furnishing the supplies or services in the Schedule will be received at the place specified in Item 8 or M handwritten, in the depository located in: Bldg 1348 Rm 2026 until 1600 local time 29 Jun 1990 (Hour) (Date)							
CAUTION - LATE Submissions, Modifications, and Withdrawals See Section L, Provision No. 52.214-7 or 52.218-10. All offers are subject to all terms and conditions contained in this solicitation.							
10. FOR INFORMATION CALL: A. NAME Harvey J. Stonewall				B. TELEPHONE NO. (Include area code) (NO COLLECT CALLS) (404) 943-1066			
<b>11. TABLE OF CONTENTS</b>							
W/ SEC	DESCRIPTION	PAGE(S)	W/ SEC	DESCRIPTION	PAGE(S)		
PART I - THE SCHEDULE			PART II - CONTRACT CLAUSES				
X A	SOLICITATION/CONTRACT FORM		X I	CONTRACT CLAUSES			
X B	SUPPLIES OR SERVICES AND PRICES/COSTS		PART III - LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACH.				
X C	DESCRIPTION/SPECS WORK STATEMENT		X J	LIST OF ATTACHMENTS			
X D	PACKAGING AND MARKING		PART IV - REPRESENTATIONS AND INSTRUCTIONS				
X E	INSPECTION AND ACCEPTANCE		X K	REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF OFFERORS			
X F	DELIVERIES OR PERFORMANCE		X L	INSTRS CONDS. AND NOTICES TO OFFERORS			
X G	CONTRACT ADMINISTRATION DATA		X M	EVALUATION FACTORS FOR AWARD			
X H	SPECIAL CONTRACT REQUIREMENTS						
<b>OFFER (Must be fully completed by offeror)</b>							
NOTE: Item 12 does not apply if the solicitation includes the provisions at 52.214-18. Minimum Bid Acceptance Period							
12. In compliance with the above, the undersigned agrees, if this offer is accepted within _____ calendar days (10 calendar days unless a different period is inserted by the offeror) from the date for receipt of offers specified above, to furnish any or all items upon which prices are offered at the price set opposite each item, delivered at the designated point(s) within the time specified in the schedule.							
13. DISCOUNT FOR PROMPT PAYMENT (See Section I, Clause No. 53.232-6)		10 CALENDAR DAYS		10 CALENDAR DAYS		10 CALENDAR DAYS	
		%		%		%	
14. ACKNOWLEDGMENT OF AMENDMENTS (The offeror acknowledges receipt of amendments to the SOLICITATION for offers and related documents numbered and dated)		AMENDMENT NO		DATE		AMENDMENT NO	
15A. NAME AND ADDRESS OF OFFEROR		CODE		FACILITY		16. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER (Type or print)	
15B. TELEPHONE NO. (Include area code)		15C. CHECK IF REMITTANCE ADDRESS IS DIFFERENT FROM ABOVE - ENTER SUCH ADDRESS IN SCHEDULE		17. SIGNATURE		18. OFFER DATE	
<b>AWARD (To be completed by Government)</b>							
19. ACCEPTED AS TO ITEMS NUMBERED		20. AMOUNT		21. ACCOUNTING AND APPROPRIATION			
22. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION: <input type="checkbox"/> 10 U.S.C. 2304(k)(1) <input type="checkbox"/> 41 U.S.C. 253(k)(1)				23. SUBMIT INVOICES TO ADDRESS SHOWN IN (4 copies unless otherwise specified)			
24. ADMINISTERED BY (If other than Item 7) CODE				25. PAYMENT WILL BE MADE BY CODE			
26. NAME OF CONTRACTING OFFICER (Type or print)				27. UNITED STATES OF AMERICA		28. AWARD DATE	
(Signature of Contracting Officer)							

IMPORTANT - Award will be made on this Form, or on Standard Form 28, or by other authorized official written notice.

STANDARD FORM 33 (REV. 4-83)  
Prescribed by GSA  
FAR (48 CFR) 53.214(c)

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CONTINUATION SHEET	DAAHB02-90-R-0014	PAGE	OF
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<div style="text-align: center;"><p>ATTACHMENT 01</p><p>STATEMENT OF WORK (SOW)</p><p>DAAHB02-90-R-0014</p></div>			

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1.0	<p><u>SCOPE.</u> The contractor shall develop a weapon capable of satisfying the performance criteria stated in the ZAP4000 System Specification, with particular emphasis on achieving (a) the probability of hit by a fully-trained gunner (with no greater aptitude than forecasted) in both clear and obscured conditions, (b) tracking of targets under battlefield conditions, and (c) gunner survivability features. The contractor shall furnish all services, materials, facilities (except approved Government Furnished Equipment (GFE) facilities) and equipment and provide all technical, planning, management, and manufacturing effort to complete the tasks described in the following paragraphs of this SOW. The contractor shall deliver reports, briefings, and design documents as specified and scheduled on the DD Forms 1423.</p>		
2.0	<p><u>REFERENCE DOCUMENTS.</u></p>		
2.1	<p><u>Military Specifications.</u> (Omitted from example)</p>		
2.2	<p><u>Military Standards.</u> (Omitted from example)</p>		
2.3	<p><u>Other Publications.</u> (Omitted from example)</p>		
3.0	<p><u>REQUIREMENTS.</u></p>		
3.1	<p><u>Fabrication.</u> The contractor shall define, fabricate, and maintain all hardware required for the Development/Proveout phase. Deliverables shall be as specified in the contract.</p>		
3.1.1	<p><u>Round.</u></p>		
3.1.1.1	<p><u>Air Vehicle.</u> The contractor shall perform the necessary design tasks and trade-off analyses to establish the air vehicle characteristics. The contractor shall design, fabricate, and test components, subsystems, and complete air vehicles to demonstrate design and performance capabilities. The contractor shall be responsible for integration of all air vehicle sections.</p>		

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3.1.1.2	<u>Airframe Integration and Assembly.</u> The contractor shall ensure the structural integrity, mating of components and/or sections, interfacing with launcher assembly, and the meeting of the physical and functional requirements for the air vehicle. As a minimum, specific hardware areas/items to receive emphasis during analyses and tests include warhead section/propulsion interface, stabilizing fins and attachments, electrical networks, electrical power supply, and air vehicle to launcher interfaces (e.g., umbilical connectors, detents).		
3.1.1.3	<u>Guidance and Control.</u> The contractor shall develop the guidance and control subsystems and components of the air vehicle. The guidance and control design shall provide the accuracy needed to meet the requirements of ZAP4000.		
3.1.1.4	<u>Warhead Section.</u> The contractor shall perform design tasks to establish a warhead section demonstrating the capability to defeat the target and meet the requirements of ZAP4000.		
3.1.1.5	<u>Propulsion Section.</u> The contractor shall perform design tasks necessary to establish a propulsion unit capable of demonstrating the capability to meet the requirements of ZAP4000.		
3.1.1.6	<u>Telemetry Section.</u> The contractor shall define the requirements for onboard test instrumentation necessary to support the flight test program outlined in paragraph 3.2.1.2 of this SOW. In addition, the contractor shall perform design tasks and provide a telemetry section to transmit engineering data to a ground receiving station for recording. The contractor shall also provide the interface hardware for assembly into the air vehicle. A method shall be provided for determining target hit coordinates.		
3.1.1.7	<u>Mock-up Rounds.</u> Mock-up rounds (inert) shall be designed with the same physical, dimensional, and electrical connectors as the tactical launcher. These rounds will be used for operational testing and field exercises, and shall have the same weight, handling characteristics and appearances (except for marking) as operational (live) ammunition. The configuration shall be designed to achieve the objective of the Operational Assessment of paragraph 3.2.2.1.		

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3.1.2	<u>Launcher.</u> The contractor shall develop a launcher to satisfy the requirements of ZAP4000. Emphasis shall be placed on designing devices that securely restrain the air vehicle in the launch tube during storage and handling and have minimal effect on the air vehicle during separation at launch. All air vehicle/launch tube interfaces shall be designed to offer minimum interference during launch. CLU/round interfaces shall be defined with emphasis on mechanisms which effectively mate and align the CLU with the round. Methods of electrical hook-up and firing disconnect shall be analyzed for performance and safety.		
3.1.3	<u>Command and Launch Unit (CLU).</u>		
3.1.3.1	<u>CLU.</u> The contractor shall develop a Command and Launch Unit meeting the requirements of ZAP4000. Maximum use shall be made of standard, nomenclature battery power sources and battery chargers (if applicable). The contractor shall design a night sight device which will demonstrate the capability to meet the performance criteria in paragraph 3.2.1.3. If the Thermal Weapon Sight (TWS) is utilized and requires integration into the CLU, the following TWS assemblies shall be used without design change: Signal/Timing, Controller, Dewar, Scanner, Infrared Imager, and LED/Visual Collimator or Cathode Ray Tube Display. Assemblies that may be changed are the telescope, main housing, control panel, battery, visual relay/eyepiece, and the wiring harness.		
3.1.3.2	<u>Integration and Assembly.</u> The contractor shall ensure the integration and assembly of the fire control components and power supply with the day/night sights as determined necessary for operation.		
3.1.3.3	<u>Mock-up CLU.</u> The contractor shall design CLUs (inert) with the same physical and dimensional characteristics of the tactical CLU for operational and field exercises. The mock-up CLU shall mate with the mock-up round. The configuration shall be designed to achieve the objectives of the Operational Assessment Test of paragraph 3.2.2.1.		
3.2	<u>Test and Evaluation.</u>		

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3.2.1	<p><u>Contractor Test Program.</u> The contractor shall plan and conduct a system test program to include soldier critical performance and supporting training as well as necessary piecepart, component, subassembly, assembly, and end item testing to demonstrate that hardware and software meet the requirements of ZAP4000. The Test Program shall assure that requirements are met in the following areas:</p> <p>Defeat of Threat Targets and Achievement of Required Pk's</p> <p>System Accuracy with Man-in-Loop Firings Against Stationary and Moving Targets</p> <p>Target Acquisition and Tracking in countermeasure (CM) and Obscured Environments:</p> <p>Track Link Hardness to Practical CM</p> <p>Hardware Portability</p> <p>Weight and Length</p> <p>Capability for Firing the Weapon Within Enclosures</p> <p>Safety, Health, and Human Factors.</p> <p>The contractor Test Program shall include the tests specified below:</p>		
3.2.1.1	(Paragraph not used)		
3.2.1.2	<p><u>System Flight Test Program.</u> The objectives of the System Flight Test Program are to prove system capability with special emphasis on accuracy, performance in degraded visibility (including night), and a minimum and maximum range. Tests will be planned and conducted by the contractor with government support at facilities at the U.S. Army Missile Range, White Sands, New Mexico. Minimum acceptable results of these tests shall be successful engagement (target hit plus adequate Pk's) of five (5) of the first nine (9) target profiles listed in Paragraph 3.2.1.2.1. The five (5) successes must include profiles 1 through 3. The government supported contractor conducted flight test program</p>		

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<p>shall be performed in accordance with the test matrix shown below with a minimum test quantity of 24 missiles. All flights shall have a man-in-the-loop and shall be conducted with contractor gunners and with at least two military gunners representative of the TAD. The gunner operating the CLU shall be remote from the launcher and protected from any launch and flight hazards (to include failures). A government Safety Release is required for this test using Army troops.</p> <p>3.2.1.2.1 <u>Flight Test Matrix.</u> The Flight Test Matrix is as follows:</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="text-align: left;">Flight Profile Number</th> <th style="text-align: left;">Range to Target (M)</th> <th style="text-align: left;">Stationary or Moving Target</th> <th style="text-align: left;">Smoke</th> <th style="text-align: left;">Day or Night</th> <th style="text-align: left;">Target in Hull Defilade</th> </tr> </thead> <tbody> <tr><td>1</td><td>1,500</td><td>Stationary</td><td>No</td><td>Day</td><td>Yes</td></tr> <tr><td>2</td><td>1,200</td><td>30 KM/H</td><td>No</td><td>Day</td><td>No</td></tr> <tr><td>3</td><td>400</td><td>30 KM/H</td><td>Yes</td><td>Night</td><td>No</td></tr> <tr><td>4</td><td>1,500</td><td>Stationary</td><td>No</td><td>Night</td><td>No</td></tr> <tr><td>5</td><td>1,000</td><td>Stationary</td><td>No</td><td>Night</td><td>Yes</td></tr> <tr><td>6 (Direct Fire Mode)</td><td>400</td><td>30 KM/H</td><td>Yes</td><td>Day</td><td>No</td></tr> <tr><td>7</td><td>1,000</td><td>30 KM/H</td><td>No</td><td>Night</td><td>No</td></tr> <tr><td>8</td><td>1,800</td><td>Stationary</td><td>No</td><td>Day</td><td>No</td></tr> <tr><td>9</td><td>1,000</td><td>15 KM/H</td><td>Yes</td><td>Day</td><td>Yes</td></tr> </tbody> </table> <p>3.2.1.2.2 <u>Flight Profiles.</u> Twelve of the missiles will be fired by the military gunners against flight profiles 1 through 9 with at least one round at each profile. Any rounds remaining after successful completion of the profiles may be used to demonstrate any other capabilities of the system. White phosphorous smoke and crossing tank targets will be used in the above profiles.</p> <p>3.2.1.2.3 <u>Tank Targets.</u> The tank targets utilized for the system flight tests will be provided by the government.</p> <p>3.2.1.3 <u>CLU Tests.</u> Field tests of the CLU in conjunction with the missile seeker/sensor subsystem shall be conducted to demonstrate performance in the dirty battlefield environment. The tests shall include target acquisition, surveil-</p>				Flight Profile Number	Range to Target (M)	Stationary or Moving Target	Smoke	Day or Night	Target in Hull Defilade	1	1,500	Stationary	No	Day	Yes	2	1,200	30 KM/H	No	Day	No	3	400	30 KM/H	Yes	Night	No	4	1,500	Stationary	No	Night	No	5	1,000	Stationary	No	Night	Yes	6 (Direct Fire Mode)	400	30 KM/H	Yes	Day	No	7	1,000	30 KM/H	No	Night	No	8	1,800	Stationary	No	Day	No	9	1,000	15 KM/H	Yes	Day	Yes
Flight Profile Number	Range to Target (M)	Stationary or Moving Target	Smoke	Day or Night	Target in Hull Defilade																																																										
1	1,500	Stationary	No	Day	Yes																																																										
2	1,200	30 KM/H	No	Day	No																																																										
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6 (Direct Fire Mode)	400	30 KM/H	Yes	Day	No																																																										
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8	1,800	Stationary	No	Day	No																																																										
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<p>lance, and tracking accuracy. Tests shall be conducted in selected environments with electronic and optical jammers, counter-measure smoke, flares, burning vehicles, rain, fog, and dust. Performance boundaries/capabilities shall be assessed by testing ranges beyond the specified system maximum range. Military gunners representative of the TAD shall be provided by the government and participate as test subjects throughout this test. Data resulting from the field tests shall be used to validate the contractor's simulation, training program, and to provide acquisition and tracking accuracy data.</p> <p>3.2.2      <u>Test and Evaluation Support.</u></p> <p>3.2.2.1    <u>Operational Assessment.</u> The contractor shall support an operational assessment planned and conducted at the Human Engineering Laboratory at Aberdeen Proving Ground, MD, and the U.S. Army Infantry School at Ft. Benning, GA. The objective of this assessment is to determine operational compatibility of the system hardware with the soldier's fighting load and modes of battlefield mobility; the overall system performance as a product of soldier aptitude, training, and organization; the effectiveness of the SMI; and the viability of the system hardware characteristics such as portability, physical dimensions, and durability. The government will provide, as test subjects, soldiers with known aptitudes and physical profiles who meet the TAD of potential operators, maintainers, and supporters of the equipment. The contractor shall maintain the ten (10) sets of system hardware (which are complete except for inert warheads) delivered to support conduct of these tests. (See para. 3.8.7.3.3).</p> <p>3.3          <u>Configuration Management Program.</u></p> <p>3.3.1        <u>Program Requirement.</u> The contractor shall develop, implement, and manage a Configuration Management Program suitable for meeting the requirements of this SOW.</p> <p>3.3.2        <u>Drawings.</u> (Omitted from example)</p> <p>3.3.3        <u>Software.</u> (Omitted from example)</p> <p>3.4          <u>Program Management.</u></p>			

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3.4.1	<u>Contractor Work Breakdown Structure (WBS).</u> For financial reporting purposes, the contractor shall develop a contract WBS, crossreferenced to the SOW and the ZAP4000 system specification. The contractor WBS must provide for identifying and reporting each cost WBS affected to include software and firmware.		
3.4.2	<u>Financial Management.</u> The contractor shall plan, budget, and implement a financial management program to control the resources allocated to meet the requirements of the SOW IAW the WBS.		
3.4.3	<u>Monthly Progress Reports.</u> The contractor shall submit monthly progress reports including a final progress report at the end of the program IAW DI-MGMT-80555, Sequence A001 and A002 on DD Form 1423.		
3.4.4	<u>Program Reviews.</u>		
3.4.4.1	<u>Program Arrangements.</u> The contractor shall plan, coordinate, participate in, and support program reviews at his plant and at government installations to be identified during which the contractor's progress will be examined. The contractor shall prepare agenda and minutes of all such reviews IAW DI-A-7089, Sequence A003 on DD Form 1423.		
3.4.4.2	<u>Program Review Meetings.</u> The first review meeting shall be conducted within three months after contract award. Subsequent reviews shall be conducted quarterly or as determined necessary by the government, based upon government initiative or requested by the contractor.		
3.5	<u>System Engineering Management.</u> The contractor shall design and develop the hardware using the "Metric System of Measurement" IAW ASTM-E380 and DOD-STD-1476. Engineering data, and technical reports, including computer programs, shall be generated in metric units.		
3.5.1	<u>General.</u> (Omitted from example)		
3.5.2	<u>Analyses/Studies.</u>		

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<p>3.5.2.1     <u>Scope.</u> The contractor shall perform design analyses and trade-offs to ensure that the ZAPPER System attains or exceeds the performance requirements as specified in ZAP4000. These analyses shall include trade-offs considering cost and hardware/soldier performance (to include Probability of Kill given an engagement) and shall reflect the operational concept to include the command, control, communications, <del>military organizational configuration</del> and the maintenance environment. Trade-offs between the elements of Probability of Kill given an engagement (<math>P_{rec} \times P_{rel} \times P_e \times P_{k/s}</math>) shall be considered if the overall requirement for <math>P_{k/e}</math> can still be achieved. Alternative designs shall be examined to identify tradeoffs among desired characteristics to increase the system's effectiveness in the following categories: lethality, <del>portability</del>, range, dirty battlefield/CM survivability, RAM, and <del>gunner aptitude and training</del>. The contractor shall assess the degradation in <math>P_h</math> occurring between the required and desired minimum ranges, and if appropriate, in the direct fire mode. Substantial improvement in lethality on a dirty battlefield and <del>improvement of gunner survivability</del> are primary priorities if accomplished with only small increases in system weight (not to exceed maximum allowable system weight). Although the proposed system must weigh no more than 19 kg, the offeror shall provide trade-offs of weight versus elements of the <math>P_{k/eng}</math> equation and survivability in order to indicate the flexibility of his design. Curves or tables illustrating advantages of growing beyond the offeror's system weight (even though the maximum allowable weight is exceeded) will indicate possible growth advantages for specific missions (e.g., defense, vehicle mounted). Analyses and trade-offs shall be reported IAW DI-MISC-80711, Sequence A006A on DD Form 1423.</p> <p>3.5.2.2     <u>System Flight Performance and Accuracy.</u></p> <p>3.5.2.2.1   <u>Performance Simulation.</u> The contractor shall prepare, validate, maintain, and deliver an all-digital, six Degree-of Freedom (DOF), performance simulation of the proposed system concept to include gunner effects (such as <del>aptitude, training, organizational design, and human error</del>). The six DOF performance simulation and computer programs shall be used and identified in the conduct of the analyses and studies. The plan shall be IAW DI-HFAC-80742, Sequence A007 on DD Form 1423.</p>			

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3.5.2.2.2	<p><u>System Accuracy.</u> The contractor shall prepare a complete error budget breakdown identifying major factors (including soldier performance) contributing to system inaccuracy and the one sigma magnitudes of these quantities. Total errors as well as circular error probability shall be formulated and presented. Error budgets shall be presented for minimum and maximum range trajectories and for intermediate ranges in increments not to exceed 500 meters. The report shall be IAW DI-MISC-80711, Sequence A006B on DD Form 1423.</p>		
3.5.2.2.3	<p><u>System Sensitivity.</u> The contractor shall conduct studies to establish the sensitivity of system accuracy to independent variation in magnitude of each error source identified above. The report shall be IAW DI-MISC-80711, Sequence A006C on DD Form 1423.</p>		
3.5.2.2.4	<p><u>Control System Performance.</u> The contractor shall perform the overall systems analysis necessary to accurately define the total control subsystem performance requirements. This analysis shall justify the amount of control authority and the control system performance required in both the soft launch/coast mode and during the boost, sustain, and terminal phases of flight. Trade-off studies shall be performed by the contractor to identify the most cost-effective control system design approach which is consistent with the established control performance requirements. The studies shall be reported IAW DI-MISC-80711, Sequence A006D on DD Form 1423.</p>		
3.5.2.3	<p><u>Fuzing Effectiveness.</u> The contractor shall perform analyses of fuzing approaches to include, as a minimum, target and background signature(s) used for sensing, use of single or multiple target signatures, signal processing to discriminate real and false targets, CM/CCM techniques, safety considerations per MIL-STD-1316, graze sensitivity, and system analysis to achieve fuze optimization to maximize warhead effectiveness. The report shall be IAW DI-MISC-80711, Sequence A006E on DD Form 1423.</p>		
3.5.2.4	<p><u>Warhead Data.</u> The contractor shall collect and document data on characteristics of the lethal mechanism penetrator prior to target impact and after perforation of the target. The characteristics of behind armor debris or other behind armor damage mechanisms shall be measured and documented.</p>		

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<p>3.5.2.5 <u>System Battlefield Performance.</u> The contractor shall address the projected threat and battlefield conditions and perform studies and trade-off analyses to determine the <del>manned</del> system's ability to:</p> <ul style="list-style-type: none"> <li>a. engage and hit a stationary target at one-half the maximum range of the system in daylight <del>within 30 seconds after detection</del> in a seven kilometer visibility, non-nuclear, benign countermeasures environment;</li> <li>b. in daylight, acquire and lock-on a target through electronic countermeasures, aerosol, smoke, dust, fog, rain, and other degraded atmospheric conditions, target background, and clutter;</li> <li>c. in daylight, engage and maintain a specified rate of fire against stationary, high crossing rate, evasive, and maneuvering targets; and</li> <li>d. reduce <del>gunner's exposure and reaction times</del>, and the time of flight for the projectile.</li> </ul> <p>The analyses shall be reported IAW DI-MISC-80711, Sequence ^006F on DD Form 1423.</p> <p>3.6 <u>Reliability, Availability and Maintainability (RAM) Program.</u> (Omitted from example)</p> <p>3.7 <u>Integrated Logistics Support (ILS) Program.</u> (Note: See AMC PAM 700-21, ILS Contracting Guide, for more complete example. Also the use of the SOW module in LOGPAPS will be helpful (see Reference 120)).</p> <p>3.7.1 <u>Logistics Support Analysis (LSA).</u> The contractor shall conduct LSA for this and subsequent phases of the program. Trade studies or alternate support concepts, including determining what would be required to completely eliminate field maintenance, will be performed. The predecessor system support structure shall be used as the baseline. <del>These analyses shall be coordinated with, and shall not duplicate, analyses conducted under the MANPRINT Program (Para. 3.8).</del> The contractor shall perform the following specific LSA IAW MIL-STD-1388-1A.</p>			

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<p>Task 203, Subtask 203.2.5  Task 205, Subtasks 205.2.1, 205.2.2  Task 303, Subtasks 303.2.3, 303.2.5, 303.2.6, 303.2.9  Task 401, Subtasks 401.2.1, 401.2.4  Task 501, Subtask 501.2.3</p>			
3.7.2	<p><u>Publications.</u> The contractor shall prepare system operating instructions for the technical demonstration and operational assessment phases of the program for use by government personnel. The instructions shall be IAW DI-MISC-80711, Sequence A004 on DD Form 1423.</p>		
3.8	<p><u>Manpower and Personnel Integration (MANPRINT).</u></p>		
3.8.1	<p><u>MANPRINT Program.</u> The contractor shall conduct a program integrating Manpower (Force Structuring), Personnel (Aptitude), Training, Human Factors Engineering, System Safety, and Health Hazards management so as to influence system design decisions throughout development, production, and deployment of the ZAPPER. The goals of MANPRINT in the ZAPPER program are to improve overall weapon system performance-effectiveness in the field by determining, during preliminary system design, that equipment and organizational design which yields the highest Pk% with the minimum burdens on soldier aptitude and institutional and organizational training. A Manufacturer's MANPRINT Management Plan (MMMP) shall be prepared and maintained in a current status throughout ZAPPER development IAW DI-XXXX-0000X, Sequence A005 on DD Form 1423. The contractor's organization for managing the execution of the MANPRINT program shall be at a management level comparable to the levels responsible for cost and system performance. MANPRINT shall be an agenda item at all program and technical reviews. Through analyses, the MANPRINT program shall link aptitudes of operations, maintenance, and support personnel with the contractor-developed Integrated Training System (ITS) (Para. 3.8.6). These analyses shall be coordinated with the analyses conducted under LSA tasks (Para. 3.7.1).</p>		
3.8.2	<p><u>MANPRINT Implementation.</u> The contractor shall schedule user juries as appropriate to address soldier performance of critical operations, maintenance, and support tasks required by ZAPPER hardware/software. All soldier perform-</p>		

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<p>ance tasks influencing system performance shall be documented in accordance with para. 6.2.5 of Amendment 2 of MIL-H-46855. The contractor shall establish and validate soldier performance through analyses, simulations, demonstrations, and tests.</p>			
3.8.3	<p><u>Manpower and Personnel Program Plan.</u> A Manpower and Personnel Program (MAPP) shall be prepared IAW DI-XXXX-000XX, Sequence A008 on DD Form 1423. The plan shall include, but not be limited to, the following:</p> <ul style="list-style-type: none"> <li>a. A description of the plans, analyses, tasks, and evaluations through which the contractor and subcontractors will address manpower and personnel issues and their impact on equipment design, meet manpower and personnel constraints, and generate manpower and personnel information required by the contract.</li> <li>b. A description of the procedures for integrating Manpower and Personnel Program activities with activities covered under Human Factors Engineering (Para. 3.8.7) and the Training Program and Training Equipment Plan (Para. 3.8.6.1).</li> <li>c. A description of the procedures for multiple use of common data, and procedures for coordination and avoidance of duplication of activities in the Logistic Support Analysis (LSA) and Integrated Logistic Support (ILS) Program (e.g., Task analysis results).</li> </ul>		
3.8.3.1	<p><u>Trade-off Analyses.</u> In coordination with LSA tasks, the contractor shall conduct analyses to minimize personnel aptitude requirements for operation, maintenance, and support of the ZAPPER. One analysis shall specifically address the trade-off between soldier aptitude and training time and cost. The report shall be IAW DI-MISC-80711, Sequence A006G on DD Form 1423.</p>		
3.8.4	<p><u>Soldier Performance Measurement.</u> A Soldier Performance Measurement (SPM) shall be conducted in order to establish the degree to which required task performance is attainable and sustainable. SPM shall be designed to capture data on all tasks designated as "critical" (See para. 6.2.1 of MIL-H-46855) for operations, maintenance and support functions. SPM shall provide a means of</p>		

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<p>relating the quantitative system performance requirements to the measured soldier performance for each critical task such that variations in the time and accuracy of that performance will affect the measures used to express ZAPPER system effectiveness. Performance shall be measured after personnel have been trained and following sufficient practice at the task to have attained individual peak performance (See para. 3.8.6.6.4).</p> <p>Performance measures shall be taken under a range of environmental conditions approximating those projected for the fielded system under both daylight and night operations. The environmental conditions (temperature, humidity, illumination, noise, ventilation, vibration, etc.) under which the data were gathered shall be described. Suitable military garments and equipment appropriate to the tasks and projected environmental conditions shall be worn during soldier performance measurement.</p> <p>Both the frequency and causes of errors shall be reported and shall be supplemented (if appropriate) by explanations from participants of the reasons for their performance errors. Soldier performance data shall be analyzed to determine if any of the critical tasks for operations, maintenance, or support is aptitude-sensitive. The SPM shall be reported LAW DI-HIFAC-80744, Sequence A009 on DD Form 1423.</p> <p>3.8.5      <u>(Paragraph not used)</u></p> <p>3.8.6      <u>Training.</u></p> <p>3.8.6.1    <u>Training Plan.</u> The contractor shall develop a training plan meeting the requirements of MIL-STD-1379C and which documents training requirements, assigns responsibilities, identifies actions the contractor/Government will accomplish, and establishes milestones and schedules for developing and providing institutional and noninstitutional training for operations, maintenance, and support personnel. Levels of maintenance to be documented for the ZAPPER shall be operator, unit and intermediate. The training plan shall be LAW DI-H-7066, Sequence A011 on DD Form 1423.</p> <p>3.8.6.2    <u>Training Courses.</u></p>			

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<p>3.8.6.2.1    <u>Factory Training.</u> The contractor shall develop and conduct training courses for both an Independent Government Test (IGT) for the prototype model, and a course for Instructor and Key Personnel (IKP) to include the New Equipment Training Team (NETT) personnel. Class size for both courses will be approximately 15. The contractor shall provide the personnel, text material, test equipment, simulators, tools, special fixtures, and training aids. One set of training materials and technical manuals shall be provided by the contractor for each student, the procuring activity's training group, and the TRADOC course monitor.</p> <p>3.8.6.2.2    <u>Institutional Training.</u> The contractor shall propose training that qualifies both initial entry and non-ZAPPER trained in-service personnel for all operator, maintainer and support designations. The contractor will identify tasks common to existing courses that require no or minimal modification for integration into ZAPPER courses.</p> <p>3.8.6.2.3    <u>Non-Institutional Training.</u> The contractor shall propose operator, maintainer and support sustainment training that is task oriented for each skill level. The contractor shall provide sustainment training at the contractor's facility to maintain operator, maintainer and support proficiency on infrequently performed tasks, especially for low density MOSs. Sustainment training shall be based on an analysis of the rate of skill decay.</p> <p>3.8.6.3        <u>Operator Course of Instruction.</u> The course shall be conducted in both lecture and hands-on modes.</p> <p>3.8.6.3.1    <u>Lecture Mode.</u> The lecture mode shall provide students with knowledge and understanding of the system's capabilities, limitations, interfaces and operations. This mode shall include, as a minimum, capabilities and functions of the system, pre-operational procedures, interface requirements, tactical employment, safety, operator maintenance, and setup/teardown.</p>			

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3.8.6.3.2	<u>Hands-on Mode.</u> Hands-on mode shall allow the student to become proficient with the required operations tasks. Hands-on time should constitute 70% of the training course per student. The instruction shall be of sufficient depth to insure that students are qualified to operate the system. As a minimum, the instruction shall enable the student to set up and operate the system, subsystem, and controls; demonstrate knowledge of general equipment functions and operations; perform system checks and verification procedures; and utilize techniques to obtain maximum system performance.		
3.8.6.4	<u>Maintenance Course of Instruction.</u> The course shall be conducted in both lecture and hands-on modes.		
3.8.6.4.1	<u>Lecture Mode.</u> The lecture mode shall provide students with knowledge and understanding of the capabilities, limitations, interfacing, operations, and preventive and corrective maintenance tasks/skills required. It shall include, as a minimum, capabilities, functions, and operations of the system; function of each module, signal flow, interfaces, self contained diagnostic tests and their uses; external diagnostic and other tests, measured performance data; preventive and corrective maintenance procedures; alignments and adjustments; installation and pre-operation setup/teardown.		
3.8.6.4.2	<u>Hands-on Mode.</u> The hands-on portion shall be developed around the Government maintenance concept and shall allow the student to become proficient with the required operations and the preventive and corrective maintenance tasks. Student hands-on time should constitute 60% of the training course per student. The course shall be of sufficient depth to insure that students are qualified to maintain the ZAPPER at the appropriate level using the technical manuals, general purpose test equipment, and all available diagnostics. The course shall include a minimum of 8 instructor-inserted faults or malfunctions. As a minimum, the hands-on instruction shall include, and upon completion, enable a student to remove and install major components and perform pre-op setup tests; operate the system and subsystems; execute diagnostic self-tests and interpret readouts; determine if the system /subsystem is malfunctioning or not; isolate and locate malfunctions; replace defective parts; perform all required alignments and adjustments; verify proper system/subsystem functions; and perform preventive maintenance functions.		

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<p>3.8.6.5 <u>Training Devices.</u> The contractor shall propose and, upon approval by the procuring activity, design training devices that are based on and exhibit traceable hierarchical relationships to the operations, maintenance, and support tasks for which that individual device will train. Such training devices will duplicate the hardware components of the ZAPPER system in configuration, function, and performance as necessary to train operator, maintainer, and support tasks and skills. A learning analysis that considers current Army training methodology shall be used to determine the optimum mix of training devices required, dependent upon learning difficulty and task criticality.</p> <p>3.8.6.5.1 <u>Degree of Replication.</u> Functional controls and performance characteristics shall be replicated within a concept of "only what is good enough". The contractor shall substantiate this through an analysis of the tasks to be trained and by specific references to pertinent training effectiveness studies on comparable training systems. Training device design shall replicate the spacing, shape, color and size of controls of the actual hardware and include operational performance characteristics and ballistics. Selected maintenance failures which correspond to system Reliability, Availability and Maintainability rates shall be incorporated as an instructor-selected option.</p> <p>3.8.6.5.2 <u>Training Device Test and Evaluation.</u> The contractor shall plan, conduct, and report (ZAP4000, Paragraph 4.2) a training device test program to include soldier critical performance as well as necessary piece/part component, subassembly, assembly, and end item test to demonstrate that hardware and software meet the desired requirements of training devices for the ZAPPER. The test program shall insure that requirements are met in the following areas:</p> <ul style="list-style-type: none"> <li>a. Training effectiveness using target audience personnel.</li> <li>b. Reinforcement of current skill levels of crews at the individual and collective levels.</li> <li>c. Safety, health, and human factors.</li> <li>d. System accuracy in replicating vehicles, terrain, handling and threat.</li> </ul>			

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<p>e. Reaction times, accuracies, and adequacy of operating and maintenance procedures.</p> <p>3.8.6.6 <u>Training Material Development.</u> The following paragraphs describe the requirements and procedures applicable to the development, acquisition, management control, quality assurance, validation and verification, and acceptance criteria for training materials.</p> <p>3.8.6.6.1 <u>Planning Conference.</u> A Training Planning Conference shall be conducted NLT 60 calendar days after contract award to review the training requirements of the contract, coordinate the training material development schedule, discuss the relationship of the schedule to associated program events, and define the frequency and scope of the applicable training material reviews. Agenda and minutes will be prepared IAW DI-A-7088 and DI-A-7089 respectively, Sequence A012 and A003 on DD Form 1423.</p> <p>3.8.6.6.2 <u>In-Process Review.</u> In-process quality reviews and inspections will be conducted IAW the approved documentation schedule, but may be conducted at other times if required in the judgement of the Contracting Officer's Representative (COR). Such informal in-process reviews will enable the COR to observe the work accomplished, review the content and format of the existing data for conformance to specifications, and to provide guidance and direction to the contractor.</p> <p>3.8.6.6.3 <u>Validation and Verification.</u></p> <p>3.8.6.6.3.1 <u>Validation.</u> Validation shall be performed by the contractor IAW para. 3.50 of MIL-STD-1379C for each training document delivered under this contract. Not less than 4 weeks before initiation of the validation effort for the contractor prepared training materials, the contractor shall advise the COR of the place and the time wherein the validation effort is to be performed. The COR, and other authorized representatives of the Government determined by the COR to be required, will witness each validation.</p>			

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<p>3.8.6.6.3.2 <u>Verification.</u> IAW para. 3.51 of MIL-STD-1379C, verification of all procedures shall be conducted jointly by the contractor and the Government. The contractor's responsibility in this effort shall be to demonstrate to the Government, through actual performance, that all procedures are technically accurate and adequate for their intended use. Verification of procedures contained in the training materials shall be conducted only upon successful completion of the contractors's validation effort for the training material.</p> <p>3.8.6.6.4 <u>Training Effectiveness.</u> The training program administered by the contractor to soldiers participating in SPM and other tests and evaluations conducted by the contractor shall comply with the constraints on cost and length of training identified by the contractor in his projections of training resource requirements. Results of an end-of-training comprehension examination given to participating soldiers immediately before SPM (See para. 3.8.4) begins shall be reported and analyzed. The purpose of this examination is to determine whether, prior to performance for record, the soldier-participants correctly understood the details of what they were supposed to do. Analysis of these data will include an assessment of whether any submarginal soldier performance was caused by a lack of soldier-participant aptitude, or inability of the training program to produce the required performance from a person of adequate aptitude. The report shall be IAW DI-ILSS-80047, Sequence A029 on DD Form 1423.</p> <p>3.8.6.6.5 <u>Document Review.</u> Draft and preliminary training materials shall be available for review by Government personnel. The Government will hold a technical review meeting for both technical and editorial completeness, after which all comments shall be forwarded to the contractor for inclusion into the next iteration of the training material.</p> <p>3.8.6.6.6 <u>Material Finalization.</u> Subsequent to completion of training material review, the Government will hold a training material finalization conference with the contractor to review all comments and to discuss any problems relative to the finalization and production of the final copy.</p>			

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3.8.6.7	<p><u>Course Presentation.</u> Upon validation and verification of the course materials, the contractor shall present the Operator Training Course and Maintenance Training Course, at the contractor's facilities. In addition to qualified instructors, the contractor shall provide educational specialists to monitor the courses and make on-the-spot changes to course materials as may be required.</p>		
3.8.6.8	<p><u>Courseware.</u> The contractor shall develop a POI, lesson plans, student handouts, training aids, materials and other training media which are required to conduct the ZAPPER training course. A copy of student handouts shall be given to each student attending class. The contractor shall deliver a training course outline IAW DI-H-7069, Sequence A013 on DD Form 1423.</p>		
3.8.6.9	<p><u>Quality Assurance Inspection.</u> After completion of the initial course presentation and prior to delivery of all training courseware, the contractor shall make available to the Government the completed materials for the Government's quality assurance inspection and review.</p>		
3.8.6.10	<p><u>Final Course Delivery.</u> One month after the completion of each course the contractor shall deliver to the Government reproducible copies of all course materials into which all corrections resulting from the verification, validation, and course presentation have been incorporated.</p>		
3.8.7	<p><u>Human Engineering (HE).</u></p>		
3.8.7.1	<p><u>Planning and Execution.</u> An HEP Program shall be planned and implemented in accordance with MIL-H-46855 (including Amendment 2), as tailored for the ZAPPER full-scale development objectives, characteristics and constraints, as follows:</p> <p>Paragraph 3.1.1a - Delete first three sentences. Change seventh line to: "Each task which must be performed to accomplish allocated functions shall be analyzed to determine the human . . ."</p> <p>Paragraph 3.2.1.1 - Delete.</p>		

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<p>Paragraph 3.2.1.1.1 - Delete.</p> <p>Paragraph 3.2.1.1.2 - Delete.</p> <p>Paragraph 3.2.1.1.3 - Delete.</p> <p>Paragraph 3.2.2 - In 2nd line, delete all text following "equipment." Delete 3rd line. In 4th line, delete "other appropriate."</p> <p>Paragraph 3.2.2.3e - Delete.</p> <p>Paragraph 3.2.2.5 - In 12th and 13th lines, change "shall be reflected" to "are available for inclusion."</p> <p>Paragraph 3.4 - In 2nd line, change "shall" to "should."</p> <p>The Human Engineering Program Plan shall be LAW DI-HFAC-80740, Sequence A014 on DD Form 1423.</p> <p>3.8.7.2 <u>Scope.</u> The HIE analytic, design, and test activities shall include examination of the effects of personal equipment; clothing; protective gear; extremes of natural environment including atmospheric, degraded visibility, thermal, and terrain conditions as defined by system requirements; workload contingencies; and combat and training scenarios for each deployment mode and intended duty cycle (normal, sustained and emergency.) The impact of equipment, software, and procedures on personnel availability, training times, skill levels, proficiency, and operation and maintenance under stress shall be assessed to minimize demands on personnel resources, consistent with ZAPPER system performance requirements.</p> <p>3.8.7.3 <u>HIEP Program Emphasis Areas.</u> Within the context of the above considerations, the HIE program shall include, as a minimum, the following emphasis areas:</p> <p>3.8.7.3.1 <u>Studies and Analyses.</u> HIE studies and analyses of the ZAPPER system shall be performed as applicable to the objectives of the contract in the areas outlined by MIL-H-46855 (as tailored) in general and the following system functions and issues in particular:</p>			

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<p>3.8.7.3.1.1 <u>Portability/Soldier-transportability.</u> Suitability of equipment loads, weight, and configuration to meet portability/soldier-transportability requirements.</p> <p>3.8.7.3.1.2 <u>Launcher Configuration and Controls.</u> Suitability of launcher configuration to facilitate the gunner's transition of the ZAPPER from carry position to ready-to-fire in a safe, error-free manner, consistent with specified requirements; location, configuration, and actuation characteristics of launcher controls for tube extension, safe and arm, ranging, aiming, and firing.</p> <p>3.8.7.3.1.3 <u>Crew Task Sequence.</u> Capability of integrated hardware/software/personnel/procedures to undertake emplacement, orientation, alignment initialization, checkout, firing, displacement, march order, and resupply, consistent with system performance requirements.</p> <p>3.8.7.3.1.4 <u>Nuclear, Biological, Chemical (NBC) Environment.</u> Capability of the ZAPPER and crew to meet system requirements while operating in an NBC contaminated environment and be decontaminated without losing the ability to accomplish the assigned mission.</p> <p>3.8.7.3.1.5 <u>Maintainer Interface.</u> Suitability of maintainer/hardware/ software/procedures to facilitate the meeting of system performance requirements including accomplishing maintenance involving fault isolation, manipulation, access, removal, replacement, and repair; manual operations involving pulling, pushing, lifting, or carrying; and compatibility of tools with tasks, hardware, and environment.</p> <p>3.8.7.3.1.6 <u>Critical Tasks.</u> Analysis of critical tasks shall include consideration of command, control, and communications; target acquisition including search, detection, recognition, and identification; firing and reload; target tracking; aim point designation; and ranging. Task analysis shall be coordinated with the ILS and Quality Assurance Programs. The report shall be IAW DI-XXXX-00XXX, Sequence A015 on DD Form 1423.</p>			

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3.8.7.3.2	<p><u>Design and Application.</u> Human engineering applications to design shall be governed by system requirements as stated by the system specification and conformance to the provisions of MIL-STD-1472 cited in ZAP4000. Analysis findings shall be applied to the system design. Two reports are required. One report shall be LAW DI-HFAC-80746, Sequence A016 on DD Form 1423. The other report shall be LAW DI-HFAC-80747, Sequence A017 on DD Form 1423.</p>		
3.8.7.3.3	<p><u>Test and Evaluation.</u> HE requirements shall be integrated into ZAPPER test and evaluation to demonstrate the capability of the crew to attain required system performance characteristics in general, and specifically to include: reaction times (emplacement, fire mission, resupply, and march order; weapon from carry configurations to ready-to-fire, engagement sequence, checkout and initialization, fault isolation, replacement, and repair); accuracy (fire coordination entry, launch sequence, tracking, target designation, data insertion, aiming, firing, and tracking); and adequacy of operating and maintenance procedures. Testing shall thoroughly assess human performance and human engineering design under all gunner postures and conditions of terrain, slope, climate, lighting, and stress. Specific tests shall be designed to reveal any:</p> <ul style="list-style-type: none"> <li>(a) incompatibility among tasks assigned to a single job</li> <li>(b) incompatibility between tasks assigned to different members of the same crew</li> <li>(c) incompatibility between different items of equipment in the SMI.</li> </ul> <p>HE tests may be integrated into other ZAPPER tests or performed as part of SPM (Para. 3.8.4). Dedicated HE tests shall be performed when time and accuracy requirements are primary determinants of mission success or where demonstrations of the manned system are essentially human engineering-dependent. (See para. 3.2.2.1). Test plan shall be LAW DI-HFAC-80743, Sequence A010 on DD Form 1423. The report shall be LAW DI-HFAC-80744, Sequence A018 on DD Form 1423.</p> <p>(Note: Paragraph 3.8.7 above is adapted from Reference 108.)</p>		
3.8.8	<u>System Safety and Health Hazards.</u>		

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3.8.8.1	<p><u>System Safety.</u> Hazards associated with the system and its related equipment involving explosives, propellants, electrical/electronic mechanical, environmental, X-ray, and ionizing and non-ionizing radiation shall be identified, evaluated and eliminated or acceptably controlled. Hazards within categories IA, IB, IC, ID, IIA, IIB, IIC, and IIIA specified in Appendix A of MIL-STD-882B are considered unacceptable and will be eliminated. Hazard classification of storage, handling and shipping shall be established in accordance with TB-700-2. The contractor shall conduct a system safety program that comprehensively evaluates the safety risks being assumed and shall identify all residual design and procedural hazards present (LAW Section 4 of MIL-STD-882), and all safety features of the system and components. The program shall also specify the procedural controls and precautions required to protect personnel, equipment, and property during testing. To insure that an adequate level of safety has been achieved, verification of design compliance with applicable safety standards, codes, and the safety requirements critical to man-in-the-loop testing shall be conducted LAW para. 3.8.8.1.1, Task 207, MIL-STD-882. In addition, specific test data and analyses on the design margins, and other characteristics of each critical component of the system shall be furnished in order to assess the safety of the system for man-in-the-loop firings. As a minimum, the following hazard analyses shall be performed LAW para. 3.8.8.1.1, Task 204, MIL-STD-882:</p> <ul style="list-style-type: none"> <li>a. Rocket motor firing circuit analysis (including abnormal events such as late flight motor ignition).</li> <li>b. Warhead safe &amp; arm/fuzing analysis.</li> <li>c. Launch environments/effects analysis.</li> </ul> <p>The contractor shall maintain a copy of the verification and analysis at the plant for government inspection.</p> <p>3.8.8.1.1 <u>System Safety Program Tasks.</u> The following tasks of MIL-STD-882 specifically apply:</p> <p style="padding-left: 40px;">Task 100 System Safety Program</p>		

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<p>Task 101 System Safety Program Plan. The plan shall be LAW DI-SAFT-80100, Sequence A019 on DD Form 1423.</p> <p>Task 104 Special Study Groups/System Safety Working Group SSG/SSWG Support</p> <p>Task 105 Hazard Tracking and Risk Resolution. Progress reports shall be LAW DI-SAFT-80105, Sequence A020 on DD Form 1423.</p> <p>Task 106 Test and Evaluation Safety</p> <p>Task 203 Subsystem Hazard Analysis</p> <p>Task 204 System Hazard Analysis. This report shall be LAW DI-SAFT-80101, Sequence A021 on DD Form 1423.</p> <p>Task 205 Operating and Support Hazard Analysis</p> <p>Task 206 Occupational Health Hazard Assessment</p> <p>Task 207 Safety Verification. This report shall be LAW DI-SAFT-80102, Sequence A022A on DD Form 1423.</p> <p>Task 209 Safety Assessment. This report shall be LAW DI-SAFT-80102, Sequence A022B on DD Form 1423.</p> <p>Task 210 Safety Compliance Assessment</p>			
3.8.8.1.2	<u>Surface Danger Area Data.</u> Prior to firing rounds on any government range, preliminary surface danger area designation and supporting data shall be prepared LAW DI-HI-1327A, Sequence A023 on DD Form 1423.		
3.8.8.1.3	<u>Explosive Hazard Classification.</u> The government will assign an interim hazard classification for explosive devices produced under this contract and delivered to the government. The contractor shall furnish any existing approved Department of Transportation classifications, analogy data, and/or existing test data for all energetic materials delivered under this contract. Lab sensitivity test data shall be submitted as a minimum. This report shall be LAW DI-L-3311B, Sequence A024 on DD Form 1423.		
3.8.8.2	<u>Health Hazard Assessment.</u>		
3.8.8.2.1	<u>Acoustical Energy.</u> The contractor shall design the ZAPPER system to comply with the requirements of MIL-STD-1474. Provisions shall be made to collect data for impulse noise/blast overpressure in accordance with MIL-STD-1474. (See para. 3.8.8.3.1).		

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3.8.8.2.2	<u>Lasers.</u> The contractor shall make provisions to prevent exposure of personnel to hazardous intensities of laser beams associated with the system. The contractor shall comply with guidelines for personnel protection outlined in AMC Reg 385-29.		
3.8.8.2.3	<u>Radioactive Materials.</u> Any radioactive materials proposed for use in the system will require DA authorization or Nuclear Regulatory Commission licensing. In the event that radioactive materials are proposed by the contractor, then analyses, controls, test results, and other required information shall be LAW DI-H-1332A, Sequence A025 on DD Form 1423.		
3.8.8.2.4	<u>Chemical Substances.</u> The contractor shall design the system to ensure that operations and maintenance personnel will not be exposed to concentrations of toxic substances in excess of the limits specified in Occupational Safety and Health Agency standards.		
3.8.8.3	<u>Safety and Health Hazards Assessment Verification Tests.</u> The contractor shall conduct an orderly program of components, subsystem and system tests required to accomplish the program to include man-in-the-loop firings. (See para. 3.8.8.1.1, Tasks 207 and 209).		
3.8.8.3.1	<u>Gunner Environment Launch Hazards Tests.</u> These tests include firing from enclosures and from unenclosed positions. The contractor shall compare measured parameters with those considered acceptable and shall provide data and support to assist in improving the soldier-rating and verifying the adequacy of protective measures.		
	a. Acoustical energy testing shall be accomplished in accordance with sections 5.4 and 5.5 of MEL-STD-1474. This report shall be LAW DI-H-1336, Sequence A026 on DD Form 1423.		
	b. Measurement of shock (recoil) during slug firings.		
	c. Measurement of particle size, weight, and distribution pattern of flight motor debris from preset failures.		

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<p>d. Qualitative and quantitative measurements of the noxious or toxic combustion products.</p> <p>e. Measurement of thermal and visible energy effects (heat and flash).</p> <p>3.8.8.3.2 <u>Bullet Impact Tests.</u> These tests shall demonstrate that the warhead section and propulsion section of the air vehicle meet the requirements of ZAP4000.</p> <p>(Note: A slug is a dummy projectile with a replaceable launch motor that duplicates the size, weight, and other appropriate physical characteristics of the prototype air vehicle.)</p> <p>3.8.9 <u>MANPRINT Reviews.</u> Conduct of the following reviews does not obviate the requirements for inclusion of MANPRINT as an agenda item in other reviews such as program reviews, technical reviews, Preliminary Design Reviews (PDRs), and Critical Design Reviews (CDRs).</p> <p>3.8.9.1 <u>Program Planning Review.</u> A MANPRINT program planning review at the contractor's plant, scheduled by the contractor, shall be undertaken no later than 30 DAC. The purposes of this program planning meeting are to:</p> <p>a. Insure mutual understanding of the proposed MIMP.</p> <p>b. Insure consistency of MANPRINT program planning with the objectives of the contract and applicable provisions of ZAP4000.</p> <p>c. Review the contractor's tailoring of MIL-STD-1472.</p> <p>d. Review general approach, assumptions, guidelines, schedule, and level of effort.</p> <p>e. Surface problems and/or needs for contractor access to technical information for requirements clarification.</p>			

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3.8.9.2	<p><u>MANPRINT Progress Reviews.</u> Two MANPRINT reviews shall be scheduled and conducted by the contractor. The first review shall be conducted not later than 30 days prior to the PDR; the second review shall be conducted not later than 30 days prior to the CDR. Each MANPRINT review shall cover at least the following:</p> <ul style="list-style-type: none"> <li>a. Program Accomplishments.</li> <li>b. System Integration and Interactions (including coordination with the ILS, RAM, and Quality Assurance Programs to minimize duplication of effort).</li> <li>c. Principal Human Performance Requirements.</li> <li>d. Human Engineering Design.</li> <li>e. MPT, Health Hazard and Safety Implications.</li> </ul> <p>The report shall be LAW DI-HFAC-80741, Sequence A027 on DD Form 1423.</p>		

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<div style="text-align: center;"><p>SECTION J</p><p>LIST OF DOCUMENTS, EXHIBITS, AND OTHER ATTACHMENTS</p><p>DAAHB02-90-R-0014</p></div>			

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<p align="center"><b>SECTION J - LIST OF ATTACHMENTS</b></p> <p>The following documents, attachments, and exhibits comprise this solicitation:</p> <table> <thead> <tr> <th><u>Document</u></th> <th><u>Number of Pages</u></th> </tr> </thead> <tbody> <tr> <td>a. DD Form 1707, "Information to Offerors or Quotes"</td> <td align="center">2</td> </tr> <tr> <td>b. Standard Form 33 (REV 4-85) "Solicitation, Offer, and Award" (Section A)</td> <td align="center">1</td> </tr> <tr> <td>c. Sections B and C</td> <td align="center">(Omitted from example)</td> </tr> <tr> <td>d. Attachment 01, Statement of Work</td> <td align="center">32</td> </tr> <tr> <td>e. Sections D thru I</td> <td align="center">(Omitted from example)</td> </tr> <tr> <td>f. Section J</td> <td align="center">2</td> </tr> <tr> <td>g. Sections L thru M</td> <td align="center">14</td> </tr> <tr> <td>h. Attachment 02, DD Form 254, "Contracts Security Classification Specifications"</td> <td align="center">(Omitted from example)</td> </tr> <tr> <td>i. Exhibit A, DD Form 1423, "Contract Data Requirements List"</td> <td align="center">13</td> </tr> <tr> <td>j. Exhibit B, "Document Summary List"</td> <td align="center">(Omitted from example)</td> </tr> <tr> <td>k. Attachment 03, ZAP4000, "System Specification"</td> <td align="center">19</td> </tr> <tr> <td>l. Attachment 04, ZAP4050, "Environmental Requirements"</td> <td align="center">(Omitted from example)</td> </tr> <tr> <td>m. Target Audience Description</td> <td align="center">(Omitted from example)</td> </tr> <tr> <td>n. AMC Reg 385-29, Laser Safety</td> <td align="center">(Omitted from example)</td> </tr> <tr> <td>o. TRADOC Reg 350-7, A Systems Approach to Training</td> <td align="center">(Omitted from example)</td> </tr> <tr> <td>p. TRADOC Reg 350-17, Initial Entry Training Fill Policy and Procedures</td> <td align="center">(Omitted from example)</td> </tr> <tr> <td>q. TRADOC Reg 351-1, Training Analysis System</td> <td align="center">(Omitted from example)</td> </tr> <tr> <td>r. TRADOC Pam 350-30, Interservice Procedures for Instructional Development</td> <td align="center">(Omitted from example)</td> </tr> </tbody> </table>				<u>Document</u>	<u>Number of Pages</u>	a. DD Form 1707, "Information to Offerors or Quotes"	2	b. Standard Form 33 (REV 4-85) "Solicitation, Offer, and Award" (Section A)	1	c. Sections B and C	(Omitted from example)	d. Attachment 01, Statement of Work	32	e. Sections D thru I	(Omitted from example)	f. Section J	2	g. Sections L thru M	14	h. Attachment 02, DD Form 254, "Contracts Security Classification Specifications"	(Omitted from example)	i. Exhibit A, DD Form 1423, "Contract Data Requirements List"	13	j. Exhibit B, "Document Summary List"	(Omitted from example)	k. Attachment 03, ZAP4000, "System Specification"	19	l. Attachment 04, ZAP4050, "Environmental Requirements"	(Omitted from example)	m. Target Audience Description	(Omitted from example)	n. AMC Reg 385-29, Laser Safety	(Omitted from example)	o. TRADOC Reg 350-7, A Systems Approach to Training	(Omitted from example)	p. TRADOC Reg 350-17, Initial Entry Training Fill Policy and Procedures	(Omitted from example)	q. TRADOC Reg 351-1, Training Analysis System	(Omitted from example)	r. TRADOC Pam 350-30, Interservice Procedures for Instructional Development	(Omitted from example)
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<div>SECTION L</div> <div>INSTRUCTIONS AND CONDITIONS AND NOTICES TO OFFERORS</div> <div>DAAHB02-90-R-0014</div>			

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SECTION L - INSTRUCTIONS AND CONDITIONS AND NOTICES TO OFFERORS			
L.1 through L.14. (Omitted from example)			
L.15	<u>INSTRUCTIONS FOR PROPOSAL PREPARATION</u>		
L.15.1	<p><u>INSTRUCTIONS FOR PROPOSAL PREPARATION.</u> The offeror's response to this RFP shall be submitted in four volumes, organized as stated below. Total pages shall be limited to 600. All volumes and sub-volumes shall include the following:</p> <ul style="list-style-type: none"> <li>a. Title Page</li> <li>b. Table of Contents</li> <li>c. List of Tables and Figures</li> <li>d. Brief Introduction and Summary</li> </ul> <p>The proposal shall contain the offeror's proposed line of investigation; method of approach to the program; and phases into which the program may logically be divided, with schedules for completion of each phase. Offerors shall reference the proposal to the section of the RFP to which it responds. (This may be by cross-referencing, for example: "Technical proposal paragraph 3.3.2 responds to system specification 3.3.2"; or by providing a cross-reference matrix). The ZAP4000 System Specification and the SOW reflect the requirements of the program. The offeror should clearly indicate how the requirements of the program will be fulfilled.</p>		
L.15.1.1	<p><u>Volume 1, Executive Summary.</u> Recommended not to exceed 30 pages. Cover the management program, master schedules, system performance, system design, development planning, proposed testing, reliability and maintainability, ILS, MANPRINT, configuration management, employee skills to be made available, company and other facilities utilized, program or project organization relationship, and management techniques to be employed.</p>		

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<p>L.15.1.2 <u>Volume 2, Technical and Operational Suitability.</u></p> <p>a. <u>Volume 2, Section 1, System/Operational Performance.</u> Recommended not to exceed 140 pages. Provide details of the proposed <del>manned system</del> <b>performance</b>, with supporting data on physical and performance characteristics at the system, subsystem, component, and soldier levels. Include Pk/e capability (including target acquisition in clear and degraded environments, system accuracy, and , warhead/fuzing effectiveness); countermeasures immunity; physical characteristics; system survivability characteristics; and range capability (minimum and maximum). Desired features such as a remote fire capability shall be addressed.</p> <p>b. <u>Volume 2, Section 2, System/Operational Design.</u> Recommended not to exceed 120 pages. Cover the functional description, interface requirements, physical characteristics, and design configuration for all subsystem and system hardware/software. Include results of early analyses and trade-off considerations. If the Thermal Weapon sight is selected for use by the contractor, a trade-off analysis shall be included which addresses use of the sight as a "strap-on" versus integration of modules. If an alternate night sight is proposed, the contractor shall provide rationale to justify that proposal. Address the operational characteristics of the proposed system and indications of compatibility with existing infantry units. Address ILS effort to include LSA and publications.</p> <p>c. <u>Volume 2, Section 3, Test and Evaluation.</u> Recommended not to exceed 90 pages. Provide a top-level contractor Test Plan which clearly delineates (for system level and subsystem, component, and soldier testing) the hardware quantities, hardware configurations for test, proposed use of facilities, instrumentation, and personnel and other requirements in sufficient detail to provide proposal evaluators a clear understanding of the approach to be taken to meeting the requirements of this solicitation. Support to government tests shall be included. A complete list of the hardware quantities and scheduled utilization, to include GFE to conduct the test program will be furnished. The government approved TEMP is available and will be used for planning/ scheduling.</p>			

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<p>L.15.1.3 <u>Volume 3, MANPRINT</u> One (1) volume, recommended not to exceed 100 pages as follows:</p> <p>a. <u>Volume 3, Section 1, MANPRINT Organization and Management.</u> The offeror shall highlight the following in this part of the proposal:</p> <ol style="list-style-type: none"> <li>(1) Description of corporate commitment to MANPRINT.</li> <li>(2) Identification of responsibilities and authorities of all MANPRINT personnel. Include any internal policies or procedures which ensure the availability of support personnel required and internal procedures for the resolution of conflicts involving design and supportability issues.</li> <li>(3) Identification of full and part time MANPRINT personnel and their qualifications.</li> <li>(4) Description of the offeror's plans to integrate the six MANPRINT domains with each other as well as integration with other program elements (e.g., design engineering, RAM, ILS, and Quality Assurance). This section should include a table or a matrix in which the offeror shall relate the six MANPRINT domains to the system design features and a second table or matrix specifying the testing requirements of each MANPRINT domain. In describing his plans, the offeror shall relate how those plans are expected to have an effect on the performance of the system.</li> <li>(5) A cross-index to the proposal shall be provided showing where the MANPRINT requirements are addressed.</li> </ol> <p>b. <u>Volume 3, Section 2, MANPRINT Planning.</u> The offeror shall describe in detail his approach in satisfying the MANPRINT requirements of the SOW and System Specifications. The offeror shall include a description of analyses of MANPRINT parameters in order to improve total system performance (effectiveness and availability). The offeror shall describe the conduct of trade-off and sensitivity analyses to determine design alternatives and arrive at the most cost-effective military organization for</p>			

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<p style="text-align: center;">the operation, maintenance and support of the proposed system. The offeror shall include separate sections that address the human engineering, manpower and personnel, training, system safety and biomedical and health hazards aspects of the SOW and System Specifications. The offeror shall explain how these planned activities are expected to affect system design.</p> <p>L.15.1.4    <u>Volume 4, Program.</u> One (1) volume, recommended not to exceed 120 pages, as follows:</p> <ul style="list-style-type: none"> <li>a.    <u>Volume 4, Section 1, Master Program Plan.</u> This plan shall be submitted as part of the proposal and shall define the development phase. Address SOW, top level contractor test planning, software development plan, configuration management, RAM, ILS, MANPRINT, and producibility analysis.</li> <li>b.    <u>Volume 4, Section 2, Management.</u> <ul style="list-style-type: none"> <li>(1)    <u>Volume 4, Section 2, Part A, Transitioning to Production and Fielding.</u> This section shall address how well the contractor's history supports his ability to plan and execute transition to production and planning for ILS.</li> <li>(2)    <u>Volume 4, Section 2, Part B, Production and ILS Management.</u> This section will address the offeror's ability to plan, establish, and execute an effective production program.</li> <li>(3)    <u>Volume 4, Section 2, Part C, Personnel.</u> Address key managerial and technical personnel, including MANPRINT personnel, to be assigned to the program including resumes of education and experience.</li> </ul> </li> </ul> <p>L.16 through L.17 (Omitted from example)</p>			

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<div style="text-align: center;"><p>SECTION M</p><p>EVALUATION AND AWARD FACTORS</p><p>DAAHB02-90-R-0014</p></div>			

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SECTION M - EVALUATION AND AWARD FACTORS			
M.1	<u>Clauses Incorporated by Reference.</u> (Omitted from example)		
M.2	<u>Notice of Basis for Equitable Evaluation of Use of Government-Owned Production and Research Property.</u> (Omitted from example)		
M.3	<u>Basis for Award.</u>		
M.3.1	<u>Evaluation Guidance.</u> Proposals will be evaluated in accordance with DoD Directive 4105.62 dated 9 September 1985 and Army Acquisition Executive (AAE) Policy Memorandum #89-2 dated 29 March 1989. In the course of the source selection process, evaluators will be examining the adequacy of contractors' proposal in various areas. Unless otherwise specified, adequacy shall be as determined by the SSEB Chairman.		
M.3.2	<u>Evaluation Concept.</u> The underlying thrust of this solicitation, and the basis for the evaluation factors below, is to select candidate(s) for Development and Prove-Out that have the highest likelihood of defeating the postulated future soviet tank (FST) threat at least risk, with adequate operational suitability, MANPRINT, and the best potential for subsequent PI improvements in penetration capability and accuracy, within the specified size and weight.		
M.4	<u>Evaluation Approach.</u> Proposal evaluation will be divided into Technical and Operational Suitability, MANPRINT, Cost, and Management. Technical and operational suitability will be heaviest weighted. MANPRINT and Cost are separate, equal major evaluation factors and are important for their design implications. Management will be the least heavily weighted factor.		
M.4.1	<u>Technical and Operational Suitability.</u> The strongest emphasis will be given to the Technical and Operational Suitability area which is composed of the following three elements (in decreasing order of importance): <ul style="list-style-type: none"> <li>a. <del>Manned System</del> Operational Performance</li> <li>b. <del>Manned System</del> Design</li> </ul>		

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<p>c. Test and Evaluation.</p> <p>M.4.1.1 <u>Manned System Operational Performance.</u> Evaluation of this element shall consider the following six factors in decreasing order of importance:</p> <ul style="list-style-type: none"> <li>a. Pk/e capability (includes target acquisition in clear and degraded environments, <u>manned system</u> accuracy, and warhead/fuze effectiveness)</li> <li>b. Countermeasures Immunity</li> <li>c. Physical Characteristics (includes portability)</li> <li>d. Survivability</li> <li>e. Range.</li> <li>f. Maintainability and support required to sustain combat.</li> </ul> <p>Subfactors in decreasing order of importance for all of the above include existing data in the form of test data and analyses, analytical methodology, and simulation plans and program.</p> <p>M.4.1.2 <u>Manned System Design.</u> This element shall be evaluated for the following four factors in decreasing order of importance:</p> <ul style="list-style-type: none"> <li>a. Round Design</li> <li>b. Command and Launch Unit (CLU) Design</li> <li>c. Integrated Logistics Support (ILS)</li> <li>d. Preplanned Product Improvement.</li> </ul> <p>Subfactors in decreasing order of importance for round and CLU design include maturity of technology, adequacy of engineering analyses to support construction of functional prototypes, definition of and corrective measures to</p>			

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<p>reduce known risk in areas of technical, performance, schedule, RAM, and producibility, and completeness of description. Subfactors in decreasing order of importance for ILS are LSA, publications, and training.</p> <p>M.4.1.2.1 <u>Round Design.</u> (Omitted from example)</p> <p>M.4.1.2.2 <u>Command and Launch Unit (CLU) Design.</u> (Omitted from example)</p> <p>M.4.1.2.3 <u>Integrated Logistics Support.</u> (Omitted from example)</p> <p>M.4.1.2.4 <u>Preplanned Product Improvement.</u> (Omitted from example)</p> <p>M.4.1.3 <u>Test and Evaluation.</u> This element shall be divided into System Testing and Subsystem/Component Testing which are of equal importance. Subfactors of equal importance for System Testing include adequacy of proposed tests; efficient use of facilities, equipment, and personnel; and extent of government test and evaluation support required. Subfactors of equal importance for Component Testing include adequacy of proposed tests; efficient use of facilities, equipment, and personnel; critical component/subsystem performance tests; limited environmental tests; and extent of government test and evaluation support required.</p> <p>M.4.2 <u>MANPRINT.</u> MANPRINT shall be evaluated in three stages. First, application of management criteria will focus on the offeror's initial competence in carrying out a MANPRINT program. Second, domain criteria will examine the six traditional MANPRINT domains separately. Finally, systems integration criteria will look at the system as a whole and examine its subsystem interactions and relations to higher-level goals.</p> <p>M.4.2.1 <u>Management.</u> The evaluation of this element shall consider the following five factors in the offeror's proposal in decreasing order of importance.</p> <p style="margin-left: 40px;">a. <u>Concept for incorporating MANPRINT into system design.</u> The adequacy of the offeror's concept for assuring that the system design will reflect MANPRINT goals and constraints shall be evaluated.</p>			

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<div style="margin-left: 40px;"> <p>b. <u>Proposed MANPRINT Organization.</u> The offeror's proposed MANPRINT organization, level of effort, lines of authority, visibility to top-management and potential impact on assuring MANPRINT design influence shall be evaluated.</p> <p>c. <u>Concept for the MIMMP.</u> The depth and credibility for developing a Manufacturer's MANPRINT Management Plan based on requirements in the SOW shall be evaluated.</p> <p>d. <u>Dedicated MANPRINT Personnel.</u> The capability of the offeror's personnel (including key subcontractor personnel) for performing the MANPRINT tasks required by the SOW shall be evaluated.</p> <p>e. <u>Cost.</u> The adequacy of the offeror's cost analysis in relation to MANPRINT areas outlined in the SOW shall be evaluated.</p> </div> <p>M.4.2.2 <u>Domains.</u> Six MANPRINT domains shall be addressed. Failure to address one or more domains shall raise concern about the contractor's ability to conduct an adequate MANPRINT Program. The six MANPRINT domains, each of equal importance and each with separate criteria, shall be evaluated as follows:</p> <p>M.4.2.2.1 <u>Manpower.</u> The evaluation criteria for this domain, in decreasing order of importance shall be (a) Analyses, and (b) Understanding force structure concepts.</p> <div style="margin-left: 40px;"> <p>a. <u>Analyses.</u> The credibility and depth of detail with which the contractor proposes to conduct trade-off and sensitivity analyses and subsequently apply the results shall be evaluated.</p> <p>b. <u>Understanding force structure concepts.</u> The contractor shall be evaluated for his understanding and use of analytical data derived from ECA, HARDMAN and BOIP/QQPRI analyses and his appreciation of how that data will impact Army force structure.</p> </div> <p>M.4.2.2.2 <u>Personnel.</u> The evaluation of this domain shall consider the following criteria in decreasing order of importance: (a) Responsiveness to the RFP, and (b) Analyses.</p>			

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<div style="margin-left: 40px;"> <p>a. <u>Responsiveness to the RFP.</u> The offeror's compliance with and response to the aptitude constraints and guidance provided in the SOW and ZAP4000 shall be evaluated.</p> <p>b. <u>Analyses.</u> The credibility and depth of detail with which the contractor proposes to conduct trade-off and sensitivity analyses to determine the aptitude requirements of his design shall be evaluated.</p> </div> <p>M.4.2.2.3 <u>Training.</u> The evaluation criteria for this domain shall be (a) Analyses, (b) Training Concepts, and (c) Integration, in decreasing order of importance.</p> <div style="margin-left: 40px;"> <p>a. <u>Analyses.</u> The contractor shall be evaluated for the credibility and depth of detail with which he proposes to conduct trade-off and sensitivity analyses to design the training that produces the required level of human performance from those soldiers identified in the Target Audience Description (TAD).</p> <p>b. <u>Training Concepts.</u> The contractor's ability to plan, establish and implement an Integrated Training System Package to support institutional and non-institutional training shall be evaluated. The offeror's analysis of system training requirements throughout the total force using STRAP, Service School Surveys, task analyses, and other appropriate data shall also be analyzed.</p> <p>c. <u>Integration.</u> The offeror's understanding of and coordination with other domains of MANPRINT such as Manpower and Personnel as well as other programs such as ILS, shall be evaluated.</p> </div> <p>M.4.2.2.4 <u>Human Factors Engineering.</u> The evaluation criteria for this domain in decreasing order of importance shall be (a) Human Factors Engineering in Design Effort, (b) Qualified Human Factors Personnel, (c) Responsiveness to the RFP, (d) Credibility of Proposal, and (e) Management.</p>			

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<p>a. <u>Human Factors Engineering in Design Effort.</u> The adequacy of the offeror's HFE effort to assure the system design will maximize the capabilities of the soldier to operate, maintain, and support the system shall be evaluated.</p> <p>b. <u>Qualified Human Factors Personnel.</u> The qualifications of the personnel proposed to accomplish the HFE effort specified in the SOW shall be evaluated.</p> <p>c. <u>Responsiveness to the RFP.</u> The offeror's compliance with and response to the constraints and guidance provided in the SOW and ZAP4000 shall be evaluated.</p> <p>d. <u>Credibility of Proposal.</u> The contractor's depth of planning, implementation of procedures, methods of controlling costs, and level of detail shall be evaluated.</p> <p>e. <u>Management.</u> The offeror's approach in identifying and documenting functional and physical characteristics of the system, controlling changes and maintaining and reporting status shall be evaluated.</p> <p>M.4.2.2.5 <u>System Safety.</u> The criteria for System Safety evaluation are of equal importance and include (a) identification of risks and impact, and (b) Credibility of Proposal.</p> <p>a. <u>Identification of Risks and Impact.</u> The offeror's approach to identify and respond to system safety risks created by the design of the hardware shall be evaluated.</p> <p>b. <u>Credibility of Proposal.</u> The offeror's depth of planning and implementation of procedures shall be evaluated.</p> <p>M.4.2.2.6 <u>Health Hazard Assessment.</u> The evaluation of this domain shall consider (a) Responsiveness to the RFP, and (b) identification of risks and impact. Both shall be of equal importance.</p>			

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<div style="margin-left: 100px;"> <p>a. <u>Responsiveness to the RFP.</u> The offeror's compliance with and response to constraints and guidance provided in the SOW and ZAP4000 shall be evaluated.</p> <p>b. <u>Identification of Risks and Impact.</u> The offeror's approach to identify and respond to health hazards created by the design of the hardware shall be evaluated.</p> </div> <div style="margin-left: 10px;"> <p>M.4.2.3 <u>System Integration.</u> The criteria for an overall evaluation of MANPRINT in decreasing order of importance shall be (a) Soldier Machine Interface, (b) Analyses, (c) Feedback, (d) Coordination, and (e) Data Collection.</p> <div style="margin-left: 20px;"> <p>a. <u>SMI.</u> The adequacy of the contractor's procedures for integrating soldier and machine within the system (e.g., relating engineering decisions to soldier performance) shall be evaluated.</p> <p>b. <u>Analyses.</u> The offeror's approach using trade-off analysis and sensitivity analysis to consider design alternatives shall be evaluated.</p> <p>c. <u>Feedback.</u> The offeror's efforts to provide feedback between system design and MANPRINT analysis, particularly early in the design phase to assist resolution of problems, shall be evaluated.</p> <p>d. <u>Coordination.</u> The means and procedures proposed by the contractor for coordination, sharing data and avoidance of duplication among ILS, RAM, and MANPRINT programs.</p> <p>e. <u>Data Collection.</u> The contractor's procedures for fundamental data collection and analyses commonly shared by all MANPRINT domains shall be evaluated.</p> </div> </div> <div style="margin-left: 10px;"> <p>M.4.3 <u>Cost.</u> (Omitted from example)</p> <p>M.4.4 <u>Management.</u> The Management will be the least heavily weighted factor. Evaluation shall consider the following five elements in decreasing order of importance:</p> </div>			

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<ul style="list-style-type: none"> <li>a. Management Structure and Past Performance</li> <li>b. System Engineering Management</li> <li>c. Configuration Management</li> <li>d. Past Performance in Transitioning from Development into Production/Fielding</li> <li>e. Production</li> </ul> <p>M.4.4.1 <u>Management Structure and Past Performance.</u> (Omitted from example)</p> <p>M.4.4.2 <u>System Engineering Management.</u> The approach taken to integrate the system engineering effort will be evaluated.</p> <p>M.4.4.3 <u>Configuration Management.</u> (Omitted from example)</p>			

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### EXHIBIT A

#### CONTRACT DATA REQUIREMENTS LIST

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(Note: This example Contract Data Requirements List (CDRL) is limited to those items with a relationship to the MANPRINT process. This font is not used on the Form 1423s. A complete CDRL for the actual procurement of a major weapon system will be considerably longer. As noted earlier in this handbook, many Data Item Descriptions (DIDs) must be tailored for your specific application.)

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CONTRACT DATA REQUIREMENTS LIST										SYSTEM/ITEM <u>ZAPPER</u>		CONTRACTOR _____	
ATCH NR _____ TO EXHIBIT <u>A</u>		CATEGORY <u>A, MGMT &amp; MISC</u>		TO CONTRACT/PR _____		10 FREQUENCY		12 DATE OF 1ST SUBMISSION		14 DISTRIBUTION AND ADDRESSES (Address-Register Copies/Regio Copies)			
1 SEQUENCE NUMBER	2 TITLE OR DESCRIPTION OF DATA 3 SUBTITLE	3	4 CONTRACT REFERENCE	5 AUTHORITY (Data Item Number)	6 TECHNICAL OFFICE	7 11. AS OF DATE	8 10. AS OF DATE	9 11. AS OF DATE	10 12. DATE OF SUBSEQUENT SUBMITTAL	11 13. DATE	12 14. DATE		
1	Program Progress Report; Monthly Progress Report	3	CONTRACT REFERENCE	5	6	7	8	9	10	11	12		
A001	DI-MGMT-80555	3	SOW 3.4.4.3	5	6	7	8	9	10	11	12		
16. REMARKS													
This report shall be a letter report due 10 days after end of reporting period.													
1	Program Progress Report; Final Progress Report	3	CONTRACT REFERENCE	5	6	7	8	9	10	11	12		
A002	DI-MGMT-80555	3	SOW 3.4.4.3	5	6	7	8	9	10	11	12		
16. REMARKS													
The draft will require 30 days for Government review. The final report shall be submitted within 20 days after the Government-approved draft is returned to the contractor.													
1	Conference Minutes	3	CONTRACT REFERENCE	5	6	7	8	9	10	11	12		
A003	DI-A-7089	3	SOW 3.4.4.1	5	6	7	8	9	10	11	12		
16. REMARKS													
Submit 5 days after a conference, meeting, review, or inspection.													
1	Scientific and Technical Reports System Operating Instructions	3	CONTRACT REFERENCE	5	6	7	8	9	10	11	12		
A004	DI-MISC-80711	3	SOW 3.7.2	5	6	7	8	9	10	11	12		
16. REMARKS													
Submit 60 days prior to technical demonstrations or operational assessments at Government facilities. Government requires 30 days for review.													
PREPARED BY _____ DATE _____ APPROVED BY _____													

PAGE \_\_\_\_\_ OF \_\_\_\_\_ PAGES

SUPERSEDES EDITION OF 1 JUN 69, WHICH WILL BE USED UNTIL EXHAUSTED.

DD FORM 1423  
1 JAN 75

FOR TRAINING PURPOSES ONLY

## FOR TRAINING PURPOSES ONLY

CONTRACT DATA REQUIREMENTS LIST										SYSTEM/ITEM <u>ZAPPER</u>	
ATCH NR <u>    </u> TO EXHIBIT <u>A</u>										CONTRACTOR <u>    </u>	
TO CONTRACT/PR <u>    </u>										CATEGORY <u>XXXX</u>	
1. SEQUENCE NUMBER	2. TITLE OR DESCRIPTION OF DATA 3. SUBTITLE	4. AUTHORITY (Data Item Number)	5. CONTRACT REFERENCE	6. TECHNICAL OFFICE	7. DO250 REQ (A)	8. APP COOR (A)	9. INVT TO IAC (X)	10. FREQUENCY AS OF DATE	11. DATE OF 1ST SUBMISSION	12. DATE OF SUBSEQUENT SUBMISSION ID	13. DISTRIBUTION AND ADDRESSES (Address Regular Copies only)
1	A005	3	Manufacturer's MANPRINT Mgmt. Plan (MMP)	AMCPH-Z				See 16	11	See 16	14. AMCPH-Z Draft 10/0 Final 10/0
2	DI-XXXX-0000X	3	SOW 3.8.1	LT	A						
16. REMARKS Initial submission due 30 DAC. Government requires 30 days for approval. Final due 30 days after receipt of Government comments. Thereafter revision due at 6 month intervals or 15 days after changes in related plans.											
1	2	3		6				10	12		14.
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16. REMARKS (DI-XXXX-0000X continued) Related plans, Human Engineering Program Plan (DI-HFAC-80740); Training and Training Equipment Plan (DI-H-7066); and System Safety Program Plan (DI-SAF-80100) may be included by reference.											
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16. REMARKS											
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TO CONTRACT/PR _____		CATEGORY _____ MISC				CONTRACTOR _____				
1 SEQUENCE NUMBER	2 TITLE OR DESCRIPTION OF DATA 3. SUBTITLE	4 AUTHORITY (Data Item Number)	5 CONTRACT REFERENCE	6 TECHNICAL OFFICE	7 APPROPRIATE COORDINATING OFFICE (A)	8 INITIAL TO IAC (X)	9 DATE OF SUBMISSION	10 FREQUENCY	11 DATE OF SUBSEQUENT SUBMISSION	12 DISTRIBUTION AND ADDRESSES (Address Regular Copies/Specs Copies)
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CONTRACT DATA REQUIREMENTS LIST										SYSTEM/ITEM <u>ZAPPER</u>		CONTRACTOR <u></u>	
ATC# NR <u></u> TO EXHIBIT <u>A</u>		CATEGORY <u>HFAC &amp; XXXX</u>		DATE OF SUBMISSION		FREQUENCY		DATE OF SUBSEQUENT SUBMITTAL		DISTRIBUTION AND ADDRESSES			
TO CONTRACT/PR <u></u>		1. SUBTITLE		2. TITLE OR DESCRIPTION OF DATA		3. TECHNICAL OFFICE		4. FREQUENCY		5. DATE OF SUBSEQUENT SUBMITTAL			
6. AUTHORITY (Data Item Number)		7. CONTRACT REFERENCE		8. DOD/DOO REQ (A)		9. INTVT TO IAC (X)		10. AS OF DATE		11. DATE OF SUBSEQUENT SUBMITTAL			
1. A007		Human Engineering Dynamic Simulation Plan		AMCPM-Z		One/R		See 16		14. AMCPM-Z			
2. DI-HFAC-80742		SOW 3.5.2.2.1		LT A		11		See 16		14. AMCPM-Z			
16. REMARKS													
Draft to be submitted 60 DAC. Government requires 30 days for review. Final to be submitted 30 days after receipt of Government comments.													
1. A008		Manpower and Personnel Program Plan		AMCPM-Z		One/R		See 16		14. AMCPM-Z			
2. DI-XXXX-000XX		SOW 3.8.3		LT		11		See 16		14. AMCPM-Z			
16. REMARKS													
Initial submission 30 DAC. Government requires 30 days for review. Final to be submitted 30 days after receipt of Government comments.													
1. A009		Human Engineering Test Report		AMCPM-Z		ASREQ		See 16		14. A			
2. DI-HFAC-80744		SOW 3.8.4		LT		11		See 16		14. AMCPM-Z			
16. REMARKS													
A. Initial submission due 6 MAC and thereafter 20 days after completion of each test.													
1. A		NOT USED		6		10		See 16		14.			
2. A		S		7		11		See 16		14.			
16. REMARKS													
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SUPERSEDES EDITION OF 1 JUN 68, WHICH WILL BE USED UNTIL EXHAUSTED.

DD FORM 1423  
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CONTRACT DATA REQUIREMENTS LIST										SYSTEM/ITEM <u>ZAPPER</u>		
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TO CONTRACT/PR <u>    </u>												
1. SEQUENCE NUMBER	2. TITLE OR DESCRIPTION OF DATA	3. SUBTITLE	4. TECHNICAL OFFICE	5. FREQUENCY	6. DATE OF 1ST SUBMISSION	7. DATE OF SUBSEQUENT SUBMITTENT ID	8. DISTRIBUTION AND ADDRESSERS (Address as regular Copies/Ref Copy)					
1.	A010	Human Engineering Test Plan	AMCPM-Z	See 16	See 16	See 16	AMCPM-Z	Draft 2/0				
2.	DI-HFAC-80743	SOW 3.8.7.3.3	LT A	11	See 16	See 16	AMCPM-Z	Final 2/0				
16. REMARKS												
Draft to be submitted 90 days prior to testing. Government requires 30 days for review. Final to be submitted 30 days after receipt of Government comments.												
1.	A011	Training and Training Equipment Plan	AMCPM-Z	R/ASR	See 16	See 16	AMCPM-Z	Draft 10/0				
2.	DI-H-7066	SOW 3.8.6.1	LT A	11	See 16	See 16	AMCPM-Z	Final 10/0				
16. REMARKS												
Deliver plan outline 30 DAC. Deliver plan 12 months after contract award and update as required. Government approval/disapproval within 60 days.												
1.	A012	Conference Agenda	AMCPM-Z	R/ASR	See 15	See 15	AMCPM-Z	Draft 20/0				
2.	DI-A-7088	SOW 3.8.6.6.1	LT A	11	See 15	See 15	AMCPM-Z	3/0				
16. REMARKS												
Submit 15 days prior to conference. Government requires 10 days for review.												
1.	A013	Training Course/Curriculum Outlines	AMCPM-Z	One/R	See 16	See 16	AMCPM-Z	3/0				
2.	DI-H-7069	SOW 3.8.6.8	LT A	11	See 16	See 16	AMCPM-Z	3/0				
16. REMARKS												
Submit 60 days prior to start of training. Government requires 30 days for review. Outlines shall be prepared in accordance with Option 1, DID Para 10.2.5.												
PREPARED BY <u>    </u> DATE <u>    </u> APPROVED BY <u>    </u>												

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CONTRACT DATA REQUIREMENTS LIST										SYSTEM/ITEM <u>ZAPPER</u>		CONTRACTOR _____			
ATCH NR _____ TO EXHIBIT <u>A</u>		CATEGORY <u>HFAC &amp; XXXX</u>		TO CONTRACT/PR _____		10 FREQUENCY		12 DATE OF 1ST SUBMISSION		14 DISTRIBUTION AND ADDRESSES (Address Regular Copies/Repro Copies)					
1 SEQUENCE NUMBER	2 TITLE OR DESCRIPTION OF DATA	3 SUBTITLE	4 AUTHORITY (Data Item Number)	5 CONTRACT REFERENCE	6 TECHNICAL OFFICE	7 DTIC CODE (A)	8 DTIC CODE (X)	9 INPUT TO IAC	10 AS OF DATE	11 DATE OF SUBSEQUENT SUBMITTAL	12 DATE OF SUBSEQUENT SUBMITTAL	13 DATE	14 DATE		
1	Human Engineering Program Plan				AMCPM-Z				One/R		See 16		Draft 2/0		
2	DI-HFAC-80740			SOW 3.8.7.1	LT	A					See 16		Final 2/0		
16 REMARKS															
Draft to be submitted 30 DAC. Government requires 30 days for review. Final to be submitted 30 days after receipt of Government comments.															
1	Task Analysis Report				AMCPM-Z				One/R		See 16		Draft 5/0		
2	DI-XXX-00XXX			SOW 3.8.7.3.1.6	LT	A					See 16		Final 5/1		
16 REMARKS															
Submit 120 DAC. Government requires 60 days for review. Final to be submitted 90 days after receipt of comments.															
1	Human Engineering Design Approach Document-Operator				AMCPM-Z				One/R		See 16		1/0		
2	DI-HFAC-80746			SOW 3.8.7.3.2	LT	A					See 16				
16 REMARKS															
Draft to be submitted 120 days prior to CDR. Government requires 30 days for review. Final to be submitted 30 days after receipt of Government comments.															
1	Human Engineering Design Approach Document-Maintainer				AMCPM-Z				One/R		See 16		1/0		
2	DI-HFAC-80747			SOW 3.8.7.3.2	LT	A					See 16				
16 REMARKS															
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CONTRACT DATA REQUIREMENTS LIST										SYSTEM/ITEM <u>ZAPPER</u>			
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TO CONTRACT/PR <u>    </u>													
1. SEQUENCE NUMBER	2. TITLE OR DESCRIPTION OF DATA	3. SUBTITLE	4. AUTHORITY (Data Item Number)	5. CONTRACT REFERENCE	6. TECHNICAL OFFICE	7. DD250 REQ	8. APP COORD (A)	9. INPUT TO IAC (X)	10. FREQUENCY	11. AS OF DATE	12. DATE OF 1ST SUBMISSION	13. DATE OF SUBSEQUENT SUBMITTAL	14. DISTRIBUTION AND ADDRESSES (Address - Regular Copies Only)
1	A018	Human Engineering Test Report			AMCPM-Z				See 16		See 16		AMCPM-Z
2	DI-HFAC-80744	SOW 3.8.7.3.3			LT								Draft 3/0
3													Final 3/0
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CONTRACT DATA REQUIREMENTS LIST									
ATCH NR _____ TO EXHIBIT A TO CONTRACT/P/R _____		CATEGORY SAFT				SOURCE/ITEM ZAPPER CONTRACTOR _____			
1. SEQUENCE NUMBER	2. TITLE OR DESCRIPTION OF DATA SUBTITLE	3.	4. AUTHORITY (Data Item Number)	5. CONTRACT REFERENCE	6. TECHNICAL OFFICE	7. FREQUENCY	8. DATE OF SUBMISSION	9. DISTRIBUTION AND ADDRESSSES (Address-Report Copyright Copy)	10.
A022	SAFETY ASSESSMENT REPORT								
DJ-SAFT-80102									
REMARKS:									
A. Safety Verification Report: BLK 10 ASREQ, BLKS 11, 12, 13 see BLK 16. BLK 16 submit report 10 days after test and/or demonstration. Government requires 30 days for review.									
B. Safety Assessment Report: BLK 10 ONE/R, BLKS 11, 12, 13 see BLK 16. BLK 16 Initial submission 120 days prior to start of testing. Government requires 60 days for review.									

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CONTRACT DATA REQUIREMENTS LIST				SYSTEM/ITEM <u>ZAPPER</u>		14. DISTRIBUTION AND ADDRESSES (Address Regular Capital/Refer Copies)
ATCH NR <u>    </u> TO EXHIBIT <u>A</u>		CATEGORY <u>HFAC</u>		CONTRACTOR <u>    </u>		
1. SEQUENCE NUMBER	2. TITLE OR DESCRIPTION OF DATA 3. SUBTITLE	6. TECHNICAL OUTLINE	10. FREQUENCY	12. DATE OF 1ST SUBMISSION	13. DATE OF SUBSEQUENT SUBMISSION ID	15. TOTAL
4. AUTHORITY (Data Item Number)	5. CONTRACT REFERENCE	7. DOCS REQ (A)	11. AS OF DATE	12. See 16	13. See 16	15. TOTAL
1	Radioactive Material Data	AMCPM-Z	One/R	See 16	See 16	5/0
A025	DI-H-133/A	LT A	11	See 16	See 16	5/0
16. REMARKS						
Submit data 30 days after PDR. Government requires 30 days for review.						
1	Radio Measurement Report	AMCPM-Z	One/R	See 16	See 16	1/0
A026	DI-H-133/A	LT A	11	See 16	See 16	1/0
16. REMARKS						
Draft to be submitted RLT 30 days after completion of test. Government requires 30 days for review. Final to be submitted 30 days after receipt of Government comments. If efficient use of testing facilities or availability of test items						
1			10	See 16	See 16	1/0
16. REMARKS						
(DI-H-1336 cont.)						
requires incremental testing and reporting, the same schedules for reporting, review and resubmission shall be followed as for a single test.						
1	Human Engineering Progress Report	AMCPM-Z	2 Time	See 16	See 16	10/0
A027	MANPRINT Progress Review Report	LT	11	See 16	See 16	10/0
1	DI-HFAC-80741	LT	11	See 16	See 16	10/0
16. REMARKS						
Submit 20 days prior to PDR and CDR.						
PREPARED BY		DATE		APPROVED BY		DATE

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CONTRACT DATA REQUIREMENTS LIST										SYSTEM/ITEM <u>ZAPPER</u>		CONTRACTOR _____	
ATCH NR _____ TO EXHIBIT <u>A</u>		CATEGORY <u>H, ILSS, &amp; T</u>		TO CONTRACTOR _____		10 FREQUENCY		12 DATE OF 1ST SUBMISSION		14 DISTRIBUTION AND ALIENESS (Address Regular Copies/Reg Copies)			
1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE NUMBER	TITLE OR DESCRIPTION OF DATA	SUBTITLE	CONTRACT REFERENCE	THIRTEEN OFFICE	FOURTEEN COORD TO IAC (X)	FIFTEEN COORD TO IAC (A)	SIXTEEN COORD TO IAC (X)	SEVENTEEN COORD TO IAC (A)	EIGHTEEN COORD TO IAC (X)	NINETEEN COORD TO IAC (A)	DATE OF SUBSEQUENT SUBMISSION ID	DATE OF SUBSEQUENT SUBMISSION	DISTRIBUTION AND ALIENESS (Address Regular Copies/Reg Copies)
1	A028	1	Instructor's Utilization Handbook or Simulation Equipment	AMCPM-Z	1	1	1	1	1	1	See 16	See 16	AMCPM-Z
2	DI-H-7076	3	System Spec. 3.6.3.1.2(b)	LT	1	1	1	1	1	1	See 16	See 16	AMCPM-Z
16 REMARKS Deliver draft 12 MAC. Government requires 60 days for review. Deliver final Handbook 16 MAC.													
1	A029	3	Training Course Standards	AMCPM-Z	1	1	1	1	1	1	See 16	See 16	AMCPM-Z
4	DI-ILSS-80047	3	SOW 3.8.6.6.4	LT	1	1	1	1	1	1	See 16	See 16	AMCPM-Z
16 REMARKS Submit 30 days prior to start of testing involving soldiers. Government requires 15 days for review.													
1	A030	3	Test and Demonstration Reports	AMCPM-Z	1	1	1	1	1	1	See 16	See 16	AMCPM-Z
4	DI-T-1906	3	System Spec. 4.2	LT	1	1	1	1	1	1	See 16	See 16	AMCPM-Z
16 REMARKS Submit 7 days after tests are performed.													
1	3	3	NOT USED	6	1	1	1	1	1	1	See 16	See 16	AMCPM-Z
2	3	3		7	1	1	1	1	1	1	See 16	See 16	AMCPM-Z
16 REMARKS													
PREPARED BY _____ DATE _____ APPROVED BY _____													

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## **ATTACHMENT 03 SYSTEM SPECIFICATION**

**(ZAP4000)**

**DAAHB02-90-R-0014**

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ZAP4000

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- 1.0 SCOPE. This specification establishes the performance, design, development, and test requirements for the ZAPPER System.
- 2.0 APPLICABLE DOCUMENTS. (Omitted from example)
- 3.0 REQUIREMENTS.
- 3.1 System Definition. The ZAPPER shall be designed to provide a manportable anti-armor system with the capability to defeat the current and projected armor threat into the year 2000. The manned ZAPPER shall have a probability of kill as specified herein, in all battlefield environments including, an electronic, electro-optical countermeasures environment, as stated herein. To reduce gunner vulnerability, the system shall be capable of being fired from enclosures with a reduced signature, increased lethality and at a range twice that of the present standard system. The ZAPPER system shall be lighter, less bulky and require less training than the system currently employed.
- 3.1.1 General Description. The functional components which comprise the ZAPPER are a round, a command and launch unit, training devices, and intermediate forward test equipment (IFTE), if required.
- 3.1.1.1 Round. The round is the expendable portion of the weapon. It shall be of the wooden round concept with a shelf life of not less than ten years.
- 3.1.1.2 Command and Launch Unit (CLU). The CLU is the reusable portion of the tactical weapon system. It shall have a trigger mechanism, built-in test (BIT) and guidance and fire control functions.
- 3.1.1.3 Peculiar Support Equipment (PSE). PSE, if required at any support level, shall be minimized and shall be justified based on analysis of cost of PSE versus cost of redesign of hardware to eliminate the use of PSE.
- 3.1.1.4 Training Devices. The Training Devices shall support all phases of training from initial-entry training to individual and crew-sustainment training at using units. Testing of proposed training devices shall require the use of personnel who are representative of the TAD.
- 3.1.2 Missions. The ZAPPER's primary mission is to defeat threat armored vehicles listed in Annex 1 hereto, (not included). Other missions, which shall not degrade the primary mission, include engagement of bunkers, other point targets, and helicopters listed in Annex 5, hereto, (not included). ZAPPER shall significantly increase the combat effectiveness of all infantry units by supplementing the heavy antitank/assault weapon and providing the anti-armor employment dictated by the continued and increasing emphasis on mechanized combat in future warfare.

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- 3.1.3 System Diagram. (Omitted from example.)
- 3.1.4 Interface Definition. The system must be designed giving consideration to the operator and operational interfaces involved.
- 3.1.5 Government-Furnished Material. (Omitted from example.)
- 3.1.6 Operational and Organizational Concepts. The ZAPPER shall be a manportable system employed by dismounted infantry at platoon level to destroy enemy armor in all theaters of operation. ZAPPER shall be controlled by the platoon leader and employed by the squad leader. Mission assignments shall be made by the platoon leader, and the weapon shall be used for multiple tank engagements. Increased gunner survivability shall be a primary employment consideration. The system launch and all-environment sighting/ surveillance capabilities shall permit firing from protected fighting positions, impose minimum operational constraints and enable targets to be engaged at long ranges in degraded environments.
- 3.2 Characteristics.
  - 3.2.1 Performance Characteristics.
    - 3.2.1.1 User Profile: The design of the system hardware shall conform to the capabilities and limitations of soldier operators, maintainers, and supporters having the following profiles.
      - a. Fully-equipped male soldiers with 5th through 95th percentile physical dimensions with physical profiles 111221 or better and whose aptitudes are as described in Paragraph 3.2.1.8.
      - b. Have institutional (skill attainment) operational training not exceeding 35 hours (at a cost NTE \$1,200 per student in class sizes of 100 students) and unit (skill sustainment) training NTE 15 hours quarterly (at a cost of NTE \$400 per student, per platoon).
    - 3.2.1.2 Employment Time/Rate of Fire. The employment time for the system shall not exceed 1.5 minutes. Employment time is defined as the time to transition from unassembled carrying mode to ready-to-fire. The maximum time required to go from the standby mode to ready-to-fire shall not exceed 8 seconds, using soldiers described in the TAD with no more than the institutional training proposed by the contractor. The time required to cool down the system to a standby mode or go to a ready-to-fire mode again shall not exceed one minute. The system rate of fire using one CLU with multiple rounds, shall be no less

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than 4 rounds per 3 minutes. Rate of fire shall be calculated by using the time from trigger pull to trigger pull while engaging fully exposed stationary targets at 3/4 of the system's maximum range.

- 3.2.1.3 Target Engagement Capability. The time for the manned system to engage a stationary threat target in daylight at one-half the maximum range of the system shall not exceed 30 seconds after correct target identification in a 7-kilometer visibility, non-nuclear, benign countermeasures environment. Under NBC, night or other adverse conditions the engagement time shall not exceed 45 seconds after correct target identification.
- 3.2.1.4 Hit Probability. (System Effectiveness). The hit probability (Ph) for the above engagement shall be at least .81 when calculated by an equation/formula containing one or more specific terms describing the soldier performance of critical operations tasks. Ph of at least .65 is desired under NBC, night and other adverse conditions. Until test data are available for use in this calculation, a value not to exceed .90 may be substituted for any such term.
- 3.2.1.5 Field of View. To accomplish battlefield surveillance and target acquisition and to provide the gunner the capability to determine that the target can be successfully engaged before being masked by obscuring terrain features, the sighting device shall have a field of view of at least 45 degrees elevation by 90 degrees azimuth. A narrow field of view shall be provided if needed to accomplish recognition out to system maximum range.
- 3.2.1.6 Manned System Availability. Manned system availability with man-in-the-loop or MANPRINT availability (AMANPRINT) shall be .79 or higher when calculated by the formula in Reference 110:

$$AMANPRINT = \frac{OT + ST_o}{OT + ST_o + ST_i + TCM + TPM + TALDT}$$

where,

OT = operating time during a given period,

ST = standby time or the total time the system is not operating or being maintained, (this measure is calculated solely to determine operable and inoperable standby time.)

ST<sub>o</sub> = operable standby time or the time the system is operable but not being operated or maintained,

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STi = Inoperable standby time or the time the system is inoperable but presumed operable,

TCM = Total corrective maintenance or time the system is being repaired following a failure,

TPM = Total preventive maintenance or the time the system is being maintained for periodic maintenance (not including maintenance of failed item), and,

TALDT = Total administrative and logistic downtime or the time the system is waiting for maintenance (either corrective or preventive) but is not actually being maintained (e.g., waiting for parts or maintenance personnel).

### 3.2.1.7 Survivability.

3.2.1.7.1 Firing From Enclosures. The manned system shall be capable of firing safely and with no performance degradation from a covered fighting position (one or two-man with openings, front and rear, permitted) and an enclosure of 38.5 cubic meters volume with 2.5 square meters of openings. Toxicity levels shall permit personnel to remain in the enclosure indefinitely after a single firing without exposing them to toxic hazards in excess of those permitted by para 5.13.7.4 of MIL-STD-1472.

3.2.1.7.2 Firing Signature. The weapon firing signature (noise, flash, smoke, backblast) shall be reduced by 35 percent when compared to the current standard system.

3.2.1.7.3 Gunner Exposure. The system, whether fire and forget or track after fire, shall show a reduction in gunner exposure time of at least 15 percent when compared to the current standard system. (Exposure is defined as visibility to optically-aided enemy battlefield observation.) Gunner exposure time includes the period of time during which the gunner acquires a target, performs prefire operations, fires the weapon, tracks the round (if required) and reloads the weapon.

3.2.1.8 Training. The institutional training program for the ZAPPER gunner shall be geared to the lowest 20% of the aptitude range stated in the Target Audience Description and shall enable infantry personnel in that aptitude range to achieve the performance standards contained in para. 3.2.1.2 and 3.2.1.4 above. A capability for embedded training with the CLU for critical operations and maintenance tasks is desirable.

### 3.2.2 Physical Characteristics.

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- 3.2.2.1 Weight. The system hardware, which includes one round, the command and launch unit, a carry bag if required, and any other components required to engage a target and perform surveillance for at least four hours, shall weigh 14.5 kg or less (desired) to 19.0 kg (maximum). An add-on remote launch capability from a distance of at least 50 meters with additional weight not greater than 12 kg is desired.
- 3.2.2.2 Shape. The physical shape of hardware components shall provide for ease of soldier portability and be compatible with the fully equipped male soldier population wearing protective clothing.
- 3.2.2.3 Length. The carry length of the largest system hardware component shall not exceed 120 centimeters.
- 3.2.2.4 Diameter. The diameter of the round including protective caps shall not exceed 23 centimeters with 21 centimeters desired.
- 3.2.2.5 Transport and Storage. The system hardware/software components shall be capable of transport and storage in the Bradley Fighting Vehicle (BFV), High Mobility Multipurpose Wheeled Vehicle (HMMWV), and USMC Light Armored Vehicle (LAV). The round shall be compatible with the storage racks on the BFV, HMMWV, and LAV with the CLU in an appropriate mount. When tactically packaged, it shall be transportable without damage by rail, air, marine, or truck and in tactical wheeled and tracked vehicles over rough terrain and air dropped as equipment carried by individual parachutists or in resupply bundles without degradation in performance resulting therefrom. Tactical packaging shall allow full deployment of the weapon within 90 seconds.
- 3.2.2.6 Health and Safety. The design of the system shall consider optimum safety of personnel when transporting, storing, operating, and maintaining the ZAPPER. The system shall conform to the health and safety requirements of paragraphs 4, 5.13.2.2, 5.13.5.1, and 5.13.7, MIL-STD-1472 and paragraph 5.4, MIL-STD-1474.
- 3.2.3 Maintainability.
- 3.2.3.1 Round. The round is considered a "wooden round" and shall have no maintainability requirements associated with field repair other than cleaning.

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- 3.2.3.2 Command and Launch Unit (CLU). The CLU Mean-Time-To-Repair (MTTR) shall not exceed one hour at the Intermediate Level. No more than 30% of the total maintenance actions shall occur at the Intermediate Level. MTTR includes time to fault-isolate, repair and verify, or test. If Intermediate Level repair is not possible, Operational Readiness Floats (ORF) or Repairable Exchange (RX) shall be used to maintain operational availability. The Unit/Intermediate maintenance level shall be designed to reduce operation and support (O&S) costs by at least 30% (50% desired) when compared to the predecessor system. Use of standard automatic test equipment or suitable alternatives shall be considered as acceptable options.
- 3.2.3.2.1 Maintainability. Maintainability characteristics shall be emphasized. Design shall stress ready access and ease of replacement of replaceable parts. No special tools shall be required and use of "plug-in" parts is desirable.
- 3.2.3.2.2 Intermediate Forward Test Equipment (IFTE). If IFTE is required, CLU input/output signals shall be made available to test connectors on the CLU case. ~~Manpower constraints in the use of IFTE shall be based on the manpower numbers and MOSS established for the intermediate level maintenance for the predecessor system.~~
- 3.2.3.3 Support System.
- 3.2.3.3.1 Crew and Proficiency Trainers. This equipment shall be maintainable by intermediate level (IL) test equipment.
- 3.2.3.3.2 Intermediate Level. Intermediate level test equipment, if required, shall be supported to the maximum extent possible by using MTOE tools, TMDE, and other existing support equipment.
- 3.2.3.4 Maintenance Characteristics. The maintenance characteristics for ZAPPER shall be as follows:
- 3.2.3.4.1 Modular Design. The modular design (IAW Task 202, MIL-STD-2165) of the electronic equipment for ZAPPER shall permit easy identification and replacement of defective assemblies. Maximum use shall be made of plug-in/pull-out type components to facilitate removal/replacement.
- 3.2.3.4.2 Throwaway Concept. Based upon logistic support analysis and cost effectiveness studies, items shall be designated as "throwaway," if appropriate.
- 3.2.3.4.3 Test Points. Quick connect/disconnect test point terminals shall be incorporated in system equipment design and shall be able to interface with standard automated test equipment.

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- 3.2.4 Environmental Conditions. The system shall perform and be tested IAW environmental conditions shown herein.
- 3.2.5 Built-In-Test/Built-In-Test-Equipment (BIT/BITE). The CLU IFTE and training equipment shall incorporate BIT/BITE to monitor the readiness status of the system and its subassemblies as well as aid in location of failed elements IAW Task 202, MIL-STD-2165 and paragraph 5.2.2, MIL-STD-415. BIT/BITE shall be incorporated into system hardware in such a manner that specific system failures are detectable correctly more 90% of the time by the operator or support maintenance personnel with no more than the institutional training proposed by the contractor.
- 3.3 Design and Construction.
- 3.3.1 Materials, Processes, and Parts. (Omitted from example)
- 3.3.2 Electromagnetic Radiation. (Omitted from example)
- 3.3.3 Nameplates and Product Marking. (Omitted from example)
- 3.3.4 Workmanship. (Omitted from example)
- 3.3.5 Interchangeability. (Omitted from example)
- 3.3.6 Safety, Health and Biomedical Hazard Assessment.
- 3.3.6.1 General Requirements. Safety features shall provide for optimum safety and protection of operator, maintenance personnel, facilities, and the item itself during maintenance, storage and use consistent with mission accomplishment. The system will present no safety hazards to the operator or maintainer throughout the life cycle of the system and will be designed to minimize equipment damage, degradation of efficiency, or mission function failure due to operator induced errors, improper cabling, power failure and secondary failures.
- 3.3.6.2 Critical Hazard. The system shall be designed such that two operator errors, or two equipment failures, or one operator error and one equipment failure occurring simultaneously, shall not produce critical or catastrophic hazards as defined in paragraph 4.5.1, MIL-STD-882, Notice 1.
- 3.3.6.3 Safety Design Characteristics. Design of the weapon and associated equipment shall enhance safety of personnel and equipment. The weapon design shall include the following characteristics:

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- 3.3.6.3.1 Control Switches. Control switches shall be designed, located, and positioned to minimize the probability of inadvertent activation.
- 3.3.6.3.2 Design Safety. Design shall ensure that it is mechanically or electrically impossible to activate controls in improper sequence or to connect components and subsystems improperly.
- 3.3.6.3.3 Multiple Sequential Actions. Multiple sequential actions, not to exceed four, shall be required to launch the missile.
- 3.3.6.3.4 Power/Energy Sources. Power and stored energy sources shall be isolated from fire controls and circuits until intentionally activated.
- 3.3.6.3.5 Round Safety. The round shall incorporate safety features to protect maintenance personnel, facilities, and the round itself during maintenance.
- 3.3.6.3.6 Projectile Impact Safety. The weapon propulsion section in its tactical launch configuration and the complete round (warhead and propulsion section) in its storage and shipping container may burn but should not detonate or propagate to high order explosion when subjected to bullet impact from armor-piercing and armor-piercing tracer projectiles of 5.56mm, 7.62mm, and 12.7mm caliber fired from a range of 50 meters.
- 3.3.6.4 Launch Personnel Safety. The system hardware shall not adversely subject the gunner to blast, noise, heat, debris, or toxicity from normal launch motor and flight motor firings; from flight motor rupture at ignition; or from warhead detonation at minimum tolerance arming distance. The noise level shall not exceed that specified in paragraph 5.4, MIL-STD-1474.
- 3.3.6.5 Launch Safety. Flight motor ignition shall not be possible prior to safety separation distance from the gunner (as established by the contractor or tests in the preceding phase) nor so late as to allow ground impact of the air vehicle during normal firing. The Safe and Arm device shall remain locked in a safe position and flight motor ignition prevented for abnormal launch events, such as dropping of the weapon. Flight motor ignition in tube shall result in locking up the Safe and Arm device in the safe position. The round shall not present any additional hazards in case of hangfire/misfire.

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- 3.3.6.6 Safety Factors. After anticipated degradation from environmental conditions and expected shelf life, the launch motor, flight motor, and launch tube shall have safety factors not less than 1.5 times the mean plus three standard deviations of the peak operating pressure. Required proof testing shall be conducted at 1.2 times the mean plus three standard deviations of the peak operating pressure. It is desired that the launch motor design consider a fail-safe mode in the event of launch motor overpressure. Gas systems shall have a minimum burst pressure of four times fill pressure and a proof pressure of 1.5 times normal operating or fill pressure.
- 3.3.6.7 Laser Safety. Design of lasers shall be such that the lowest class possible to perform the intended function shall be utilized and shall meet the safety design requirements specified in paragraph 4, MIL-STD-1425; paragraph 5.13.7.5, MIL-STD-1472 and Requirement 1, MIL-STD-454.
- 3.3.6.8 Electrical Safety. Personnel and equipment safety measures shall comply with Requirements 1 and 2 of MIL-STD-454.
- 3.3.6.9 Electro-Explosive Devices. Electro-explosive devices critical to safety shall meet the design and performance requirements of paragraph 4.2, MIL-STD-1512 and paragraphs 3.3, and 4, MIL-I-23659, and shall withstand the following without functioning:
- a. Electrostatic discharge of 25,00 volts from a 500 picofarad capacitor through a 500 ohm resistor. This discharge shall be applied between bridge and case and also through the bridge.
  - b. The greater of one ampere direct current or one watt of power for five minutes applied through the bridge.
- 3.3.6.10 Fuze. The fuze shall meet design requirements of paragraph 4.2 of MIL-STD-1316. In addition, the fuze shall meet the following requirements:
- a. Provide safety during handling and subnormal air vehicle acceleration.
  - b. Prevent functioning of its firing circuit upon completion of arming if the graze switch or a segment of the crush switch is closed prior to completion of arming.
- 3.3.6.11 Toxic Materials and Carcinogens. Highly toxic materials and carcinogenic materials shall not be used in the design, maintenance, or support of the system. Moderately toxic materials may be used provided the design and controls preclude personnel from being exposed to environments in excess of

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those specified in 29 CFR 1910 and other acceptable industrial hygiene standards referenced therein. Except for propellants and explosives, materials shall be used which, when burned or exposed to high temperatures, do not give off toxic fumes or support combustion.

- 3.3.6.12 Radioactive Materials. Radioactive materials used in the system shall be selected to minimize hazard to personnel and must be approved by the government. Request for approval shall contain the design and marking information specified in paragraph 30 of Appendix E, MIL-STD-129.
- 3.3.6.13 Insensitive Munitions. The system shall meet the munitions requirements of NAVSEAINST 8010.5 in the shipping and storage container. It is desired that the requirements be met with the air vehicle in the launch tube. Additionally, the capability to meet the propellant requirements of NAVSEAINST 8010.13 is desired.
- 3.3.7 Human Performance/Human Engineering.
- 3.3.7.1 Human Performance. The system concept, configuration, and operation shall be directed towards minimizing human performance requirements necessary to meet manned system performance requirements specified herein. The design of the system shall be compatible with personnel wearing NBC and cold weather protective clothing and shall provide the means to facilitate carry by the individual infantryman through mountainous and jungle terrain. All measures of conformance to system requirements shall be obtained with the soldier-in-the-loop (operator, maintainer, and supporter). The hardware shall not significantly degrade the typical soldiers' performance over that of the soldier armed with the predecessor system on the USAHEC Mobility/Portability course. It is desired that this performance be improved by 20%. The CLU sight shall have an adjustable diopter to facilitate weapon use by a gunner with a physical profile of 111221.
- 3.3.7.2 Human Engineering. The detailed design and functionality of the ZAPPER shall be in accordance with the applicable sections of MIL-STD-1472. The applicable sections include (but are not limited to) the design criteria stated in paragraphs 1.4, 4, 5.6 and 5.11.
- 3.3.7.3 Launch Environment. Impulse noise shall not exceed limit W for unprotected ears IAW paragraph 5.4.1.1 and Table 5 of MIL-STD-1474. Limits X or Y, for which hearing protection is mandatory, shall be selected only if it can be clearly documented that meeting limit W is beyond the state-of-the-art, seriously degrades system performance, or is cost prohibitive.

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- 3.4 Documentation. (Omitted from example)
- 3.5 Logistics. (Omitted from example)
- 3.6 Mannpower, Personnel, and Training.
- 3.6.1 Mannpower Levels. Operators shall not exceed a gunner and assistant gunner; the mannpower level of the maintenance support organization at unit level shall not exceed that of the predecessor system and shall be reduced by 2 personnel at intermediate level organizations; depot level maintenance organizations shall not exceed predecessor mannpower levels. The number and frequency of performance of maintenance tasks shall be considered in analyses to determine cost-effective organizational design.
- 3.6.1.1 Crew Size. In emergencies the hardware shall be operable by one soldier.
- 3.6.1.2 Maintenance Tasks. No single maintenance task shall require more than one soldier. The number of maintenance tasks, when compared to the present antitank system, shall be decreased by 20% at the unit level.
- 3.6.2 Personnel. The Target Audience Description (see Section J) lists the expected aptitude levels (ASVAB scores) of the soldiers who have been identified as the likely operators and maintainers of the ZAPPER system. The cognitive workload required for execution of critical operations tasks shall be successfully performed by soldiers of the lowest 20% of the GT score range stated in the Target Audience Description.
- 3.6.2.1 Aptitude. The ZAPPER system hardware shall be maintainable to the specified performance standards by personnel holding MOS 27E20 with OF/EL scores of from 95-115.
- 3.6.3 Training. Training programs and equipment shall be specifically designed to support all phases of training from initial entry training to individual crew sustainment training. (See SOW Paragraph 3.8.6). The training program shall:
- (a) comply with the systems approach to training (SAT) to include front-end analysis, job and task analysis, and course design.
  - (b) minimize the training burden through enhanced ZAPPER design.
  - (c) incorporate state-of-the-art techniques in course development and instructional methods.
  - (d) Provide for a 25% student surge capability in institutional training.

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- (e) identify GFE required for training.

### 3.6.3.1 Training System Characteristics.

- 3.6.3.1.1 Embedded Training (ET). Training proposed by the contractor shall include a MILES capability and necessary equipment to interface with the NTC instrumentation system and Light Division Training Center. ET shall not adversely affect mission performance nor significantly degrade system availability, maintainability, or component life.

### 3.6.3.1.2 Courseware. The contractor's training program shall:

- (a) orient courseware to the appropriate TAD education level (i.e., NTE ninth grade RGL)
- (b) include an Instructor's Handbook for all hardware and for all training devices IAW DI-H-7076, Sequence A028 on DD Form 1423.

## 4.0 QUALITY ASSURANCE PROVISIONS.

- 4.1 General. Unless otherwise specified in the contract, the Contractor is responsible for the performance of all inspections, examinations, tests, demonstrations, and analyses as specified herein. The requirements of Section 3 of this specification shall be verified IAW the contractor-prepared, Government-approved test, evaluation, and measurement plans required by the SOW and this System Specification (ZAP4000). The Government reserves the right to perform any of the inspections where such inspections are deemed necessary to assure that materiel and services conform to the prescribed system performance requirements stated in paragraph 3.2.1 above.

- 4.2 Quality Conformance. The verification of the requirements of Section 3 shall be satisfied when the examinations, analyses, inspections, demonstrations, and tests are successfully completed. Verifications will be performed as shown in Table 1. Test reports shall be IAW DI-T-1906, Sequence A030 on DD Form 1423, unless specifically specified otherwise in the CDRL.

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TABLE 1  
QUALITY CONFORMANCE VERIFICATIONS

Requirement Paragraph	Title	Verified By:			
		Analysis	Inspection	Demonstrations	Test
3.2.1.3	Target Engagement Capability	X			X
3.2.1.4	Hit Probability	X			X
3.2.1.7	Survivability	X		X	X
3.2.2.1	Weight		X		
3.2.2.2	Shape		X	X	
3.2.2.3	Length		X		
3.2.2.4	Diameter		X		
3.2.2.5	Transport and Storage			X	
3.2.2.6	Health and Safety	X		X	
3.2.3	Maintainability	X		X	
3.2.4	Environmental Conditions	X			X
3.2.5	Built-In Test/Built-In Test Equipment	X		X	X
3.3.6	Safety, Health and Biomedical Hazard Assessment	X			X
3.3.7	Human Performance/Human Engineering	X		X	X
3.6	Manpower, Personnel, and Training	X		X	
3.8.6.5.2 (SOW)	Training Device System	X			X

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- 4.2.1 Analysis. Analysis is defined as a study based on measured or analytical data that is intended to verify compliance with the requirements demanded by this specification. Data may be composed of a compilation of existing data or design solutions, and may also be derived from original, lower-level verifications. Data may also be derived from previous accepted analytical efforts. Data may be interpolated and may also be extrapolated, as applicable. Interpolations, extrapolations, and estimates shall be clearly identified as such in the text of any report of such analysis.
- 4.2.2 Inspection. Inspection is defined as investigation, without the use of special laboratory equipment, procedures, supplies, or services to determine compliance to those specified requirements which can be determined by such investigations. For implementing the inspection process, actual hardware, technical data, drawings, manufacturing processes, procedures, common test equipment, and manuals may be used. Inspection is generally non-operating and non-destructive.
- 4.2.3 Demonstration. Demonstration is defined as verification of compliance with specified functional performance requirements by system hardware/software. The use of special instrumentation, test facilities, and data collection and analysis to verify compliance with a requirement in a "demonstration" is not precluded.
- 4.2.4 Test. Test is defined as activities in the field with soldiers or in laboratories with specialized instrumentation (or a combination of both) to determine compliance with specified requirements by system hardware and software. Such tests may require special instrumentation, special/dedicated test facilities (including target vehicles and expendable materials), use of actual soldiers, data collection and processing, and formal test documentation. The analysis of data derived from testing is an integral part of the test.
- 5.0 PREPARATION FOR DELIVERY (Omitted from example)
- 6.0 NOTES.
- 6.1 Wooden Round Concept Definition. A logistical concept wherein a missile/rocket:
- (a) Is acceptable at time of manufacture as being of an acceptable (quantitative) level of reliability
  - (b) Has an acceptable (quantitative) degradation of reliability throughout its service life.

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- (c) Requires no maintenance or operational checks throughout its service life. (Surveillance tests of the stockpile are not considered as maintenance or operational checks.)

6.2  $P_{k/h}$  Definition.  $P_{k/h}$  equals probability of hit, given a reliable launch and flight, times the probability of kill, given hit.

6.3  $P_{k/e}$  Definition. Stated in the form of an equation, the effectiveness requirement in degraded conditions is:

$$P_{k/e} \text{ engagement opportunity} = P(\text{Recognition}) \times P(\text{Reliable Round}) \times P(s) \times P_{k/h}$$

$P(s)$  = probability that the gunner with characteristics in the lowest 20% of the aptitude range can perform the tasks stated in the TAD required to fire the round.

Achieving the minimum criterion in each of these factors will not meet the  $P_{k/e}$  requirement (i.e., at least one factor must exceed the minimum acceptable value for the system to meet the overall  $P_{k/e}$  requirement).

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APPENDIX A  
REFERENCES

## APPENDIX A

## REFERENCES

Section 1  
Required Publications

- |     |                      |  |
|-----|----------------------|--|
| 1.  | OMB Cir No.<br>A-109 | Major System Acquisitions  |
| 2.  | AFARS                | Army Federal Acquisition Regulation Supplement   |
| 3.  | AR 15-14             | System Acquisition Review Council Procedures   |
| 4.  | AR 40-5              | Health and Environment   |
| 5.  | AR 40-10             | Health Hazard Assessment Program in Support of the Army Materiel Acquisition Decision Process        |
| 6.  | AR 40-14             | Control and Recording Procedures for Exposure to Ionizing Radiation and Radioactive Materials        |
| 7.  | AR 40-46             | Control of Health Hazards from Lasers and Other High Intensity Optical Sources                       |
| 8.  | AR 40-501            | Standards of Medical Fitness   |
| 9.  | AR 40-583            | Control of Potential Hazards to Health from Microwave and Radio Frequency Radiation                  |
| 10. | AR 70-1              | System Acquisition Policy and Procedures   |
| 11. | AR 70-8              | Personnel Performance and Training Program (PPTP)  |
| 12. | AR 70-10             | Test and Evaluation During Development and Acquisition of Materiel                                   |
| 13. | AR 70-25             | Use of Volunteers as Subjects of Research  |
| 14. | AR 71-2              | Basis of Issue Plans (BOIP), Qualitative and Quantitative Personnel Requirements Information (QQPRI) |
| 15. | AR 71-9              | Materiel Objectives and Requirements   |
| 16. | AR 350-35            | Army Modernization Training  |
| 17. | AR 350-38            | Training Device Policies and Management  |

## References

## Appendix A

18. AR 385-9 Safety Requirements for Military Lasers
19. AR 385-10 Army Safety Program
20. AR 385-11 Ionizing Radiation Protection, Licensing, Control, Transportation, Disposal, and Radiation Safety
21. AR 385-16 System Safety Engineering and Management
22. AR 385-30 Safety Color Code Marking and Equipment
23. AR 385-32 Protective Clothing and Equipment
24. AR 385-61 Safety Studies and Reviews of Chemical Agents and Associated Weapon Systems
25. AR 385-64 Ammunition and Explosive Safety Standards
26. AR 570-1 Manpower and Equipment Control-Commissioned Officer Position Criteria
27. AR 570-2 Manpower and Equipment Control-Manpower Requirement Criteria (MARC) Table of Organization and Equipment
28. AR 570-4 Manpower Management
29. AR 570-5 Manpower Staffing, Standards System
30. AR 602-1 Human Factors Engineering Program
31. AR 602-2 Manpower and Personnel Integration (MANPRINT)
32. AR 611-101 Commissioned Officer Specialty Classification System
33. AR 611-112 Manual of Warrant Officer Military Occupational Specialties
34. AR 611-201 Enlisted Career Management Fields and Military Occupational Specialties
35. AR 680-29 Military Personnel, Organization and Types of Transaction Codes
36. AR 700-70 Application of Specifications, Standards and Related Documents in the Acquisition Process
37. AR 700-127 Integrated Logistics Support
38. AR 1000-1 Basic Policies For Systems Acquisition

39. DA PAM 11-25 Life-Cycle System Management Model For Army Systems
40. DA PAM 385-16 System Safety Management Guide
41. DA PAM 700-127 Integrated Logistic Support (ILS) Manager's Guide
42. DoDD 4105.62 Selection of Contractual Sources for Major Defense Systems
43. DoDD 5000.1 Major System Acquisitions
44. DoDD 5000.3 Test and Evaluation
45. DoDD 5000.43 Acquisition Streamlining
46. DoDD 5000.53 Manpower, Personnel, Training and Safety (MPTS) in the Defense Acquisition Process
47. DODI 5000.2 Major System Acquisition Procedures
48. MIL-HDBK-245 Preparation of Statement of Work (SOW)
49. MIL-HDBK-759 Human Factors Engineering Design for Army Materiel
50. MIL-HDBK-761 Human Engineering Guidelines for Management Information Systems
51. MIL-HDBK-763 Human Engineering Procedures Guide
52. MIL-STD-129 Marking for Shipment and Storage
53. MIL-STD-143 Standards and Specifications, Order of Preference
54. MIL-STD-415 Design Criteria for Test Provisions for Electronic Systems and Associated Equipment
55. MIL-STD-454 Standard General Requirements for Electronic Equipment
56. MIL-STD-499A Engineering Management
57. MIL-STD-881A Work Breakdown Structure for Defense Materiel Items
58. MIL-STD-882 System Safety Program Requirements
59. MIL-STD-858 Testing Standard for Personnel Parachutes
60. MIL-STD-1290 Light Fixed and Rotary-Wing Aircraft Crashworthiness



## References

## Appendix A

61. MIL-STD-1294 Acoustical Noise Limits in Helicopters
62. MIL-STD-1316 Fuze Design, Safety Criteria for
63. MIL-STD-1379B Contract Training Programs\*
64. MIL-STD-1379C Military Training Programs\*
65. MIL-STD-1388-1A DoD Requirements for a Logistic Support Analysis
66. MIL-STD-1388-2A Logistic Support Analysis Record
67. MIL-STD-1425 Safety Design Requirements for Military Lasers and Associated Support Equipment
68. MIL-STD-1472 Human Engineering Design Criteria For Military Systems, Equipment, and Facilities
69. MIL-STD-1474 Noise Limits For Army Materiel
70. MIL STD 1476 Safety Criteria and Qualification Requirements for Pyrotechnic Explosive Ammunition
71. MIL-STD-1512 Electronic Explosive Subsystems, Electrically Initiated Designs, Requirements and Test Methods.
72. MIL-STD-1567 Work Measurements
73. MIL-STD-1751 Safety and Performance Tests for Qualification of Explosives
74. MIL-STD-2165 Testability Program for Electronic Systems and Equipment
75. MIL-H-46855 Human Engineering Requirements For Military Systems, Equipment, and Facilities
76. MIL-I-23659 Initiator, Electric, General Design Specification
77. MIL-T-23991 Training Devices, Military, General Specification for
78. AMCR 70-52 System Engineering
79. AMCR 385-3 Hazard Analysis of Facilities, Equipment and Process Developments
80. AMCR 385-16 System Safety Engineering and Management Guide
81. AMCR 385-21 Determination and Assignment of AMC, Hazard Classification

\* To be superseded by MIL-STD-1379D, Military Training Programs.

82. AMCR 385-29 Laser Safety
83. SD-1 Standardization Directory
84. TRADOC Reg 350-7 A Systems Approach to Training
85. TRADOC Reg 350-17 Initial Entry Training Fill Policy and Procedures
86. TRADOC Reg 351-1 Training Requirements Analysis System
87. TRADOC Reg 351-9 Systems Training Development
88. AMC PAM 602-2 MANPRINT Handbook for Nondevelopmental Item (NDI) Acquisition
89. AMC PAM 700-21 Integrated Logistic System Contracting Guide
90. AMC PAM 715-3 The Source Selection Process, Vols. I, II, III
91. AMC TRADOC Materiel Acquisition Handbook  
PAM 70-2
92. TRADOC PAM Interservice Procedures for Instructional Development  
350-30
93. TB MED 81 Cold Injury
94. TB MED 265 Threshold Limit Values for Toxic Chemicals and Certain  
Electromagnetic Radiation
95. TB MED 501 Hearing Conservation
96. TB MED 502 Respiratory Protection Programs
97. TB MED 503 The Army Industrial Hygiene Program
98. TB MED 506 Occupational Vision
99. TB MED 507 Prevention, Treatment, and Control of Heat Injury
100. TB MED 523 Control of Hazards to Health from Microwave and Radio Frequency  
Radiation and Ultrasound
101. TB MED 524 Occupational and Environmental Health, Control of Hazards to  
Health from Laser Radiation
102. TB MED 700-2 Departu of Defense Explosives Hazard Classification Procedures

## Section 2 Related Publications

- 103. DoDD 5000.39 Acquisition and Management of Integrated Logistic Support for Systems and Equipment
- 104. MIL-STD-490 Specification Practices
- 105. MIL-STD-961 Preparation of Military Specification and Associated Documents
- 106. DoD-STD-963 Military Standard: Data Item Description (DID), Preparation
- 107. Aeronautical Design Standards ADS-30 Human Engineering Requirements for Measurement of Operator Workload

## Section 3 Other Publications

- 108. Chaikin, G. and McCommons, R. Human Factors Engineering Material for Manpower and Personnel Integration (MANPRINT) Provisions of the Request for Proposal (RFP), Aberdeen Proving Ground, MD: U.S. Army Human Engineering Laboratory Technical Memorandum 13-86, October 1986.
- 109. Lowry, J. and Seaver, D., Handbook for Quantitative Analysis of MANPRINT Considerations in Army Systems. Alexandria, VA: U.S. Army Research Institute: Research Product 88-15, June 1988.
- 110. Kaplan, J. and Crooks, W., A Concept for Developing Human Performance Specifications. Aberdeen Proving Ground, MD: U.S. Army Human Engineering Laboratory Technical Memorandum 7-80, April 1980.
- 111. McCommons, R., Human Factors Engineering Data Management Handbook, Aberdeen Proving Ground, MD: U.S. Army Human Engineering Laboratory Technical Memorandum, 6-87, March 1987.
- 112. MANPRINT Handbook for Source Selection. Department of the Army, Office, Deputy Chief of Staff for Personnel, November 1987.
- 113. MANPRINT Practitioners Guide. Department of the Army, Deputy Chief of Staff for Personnel, Draft, June 1989.

114. MANPRINT Primer. Department of the Army, Office, Deputy Chief of Staff for Personnel, June 1988.
115. How to Select and Develop Embedded Training: Overview of Interim Guidelines, Procedures and Supporting Documentation. Draft Manuscript prepared by Hi-Tech Systems, Inc. for U.S. Army Research Institute, March 1987.
116. Myers, Louis B., Tijerina, Louis, and Geddie, James C., Proposed Military Standard for Task Analysis. Aberdeen Proving Ground, MD: U.S. Army Human Engineering Laboratory Technical Memorandum 13-87, July 1987.
117. Barber, Jacob L., Hetler, Douglas W., and Jones, Robert E. Jr., Manpower and Personnel Standardization Language for Army Systems. Alexandria, VA: U.S. Army Research Institute Research Note 89-01, January 1989.
118. Guerrier, Jose H., Lowry, John C., Jones, Robert E. Jr., Guthrie, Jerry L., Barber, Jacob L. and Miles, John L. Jr., Handbook for Conducting Analysis of the Manpower, Personnel and Training Elements for A MANPRINT Assessment. Alexandria, VA: U.S. Army Research Institute Research Product, draft dated November 1988.
119. Total Quality Management Master Plan. Department of Defense, August 1988.
120. Logistics Planning and Requirements Simplification System (LOGPARS) [Computer Program and User's Handbook]. U.S. Army Materiel Readiness Support Activity, Lexington, KY, 1989.
121. CECOM Acquisition Manager's MANPRINT Guide (AMMAG). U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, 1988.
122. Gordon, Claire, et al., 1988 Anthropometric Survey of U.S. Army Personnel Summary Statistics Interim Report. Natick, MA: U.S. Army Natick Research, Development and Engineering Center Technical Report 89/027, March 1989.
123. Golden, Michael G., The Critical Link MANPRINT BULLETIN, Vol. III, No. 5, PP 16-17, Department of the Army, Deputy Chief of Staff for Personnel, March - April 1989.
124. Booher, Harold R. (Ed.), MANPRINT: An Approach to Systems Integration, Van Nostrand Reinhold, New York, NY, 1990.
125. Geddie, James C., The MANPRINT Metric in Testing and Evaluation. ARMY RESEARCH, DEVELOPMENT & ACQUISITION BULLETIN, PB 70-89-5, pp. 32-35, September - October 1989.
126. Harvey, David, TQM -- A Revolution Spurned. DEFENSE SCIENCE, VOL. 8, No. 11, pp. 35-38, December 1989

## NOTE ON ORDERING PUBLICATIONS

- a. DoD and Army publications should be requested through official publications channels (for Army employees). All others may request Army publications from Commander, Army AG Publications Center, 2800 Eastern Boulevard, Baltimore, MD 21220, and DoD publications from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.
- b. The Defense Technical Information Center (DTIC), Building 5, Cameron Station, Alexandria, VA 22304-6145 is a general source (for government personnel and current contractors only) of military service R&D reports which have completed the editorial and clearance processes.
- c. TRADOC publications should be requested from Hq USA TRADOC, ATTN: ATCD-SP, Fort Monroe, VA 23651-5000.
- d. Medical technical bulletins should be requested from The Surgeon General, HQDA (ATTN: DASG-PSP), 5109 Leesburg Pike, Falls Church, VA 22041-3258.
- e. Military and DoD specifications, standards, handbooks and data item descriptions (DIDs) should be requested on DD Form 1425 from Commander, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.
- f. Reference 107 may be requested from Commander, U.S. Army Aviation Systems Command, (ATTN: AMSAV-E1), 4300 Goodfellow Boulevard, St. Louis, MO. 63120.
- g. References 108, 110, 111, 116 and 123 are available from Director, US Army Human Engineering Laboratory, ATTN: Tech Reports Office, Aberdeen Proving Ground, MD 21005-5055.
- h. References 112, 113 and 114 may be requested from Director, MANPRINT Policy Office, HQDA (ATTN: DAPE-ZAM), The Pentagon, Washington, D.C. 20310-0300.
- i. References 109, 115, 117 and 118 may be requested from Commander, U.S. Army Research Institute, (ATTN: PERI-SM), 5001 Eisenhower Avenue, Alexandria, VA 22333-5600.
- j. Reference 120 may be requested from Commander U.S. Army Materiel Readiness Support Activity, Lexington, KY 40511-5101.
- k. Reference 121 may be requested from Commander, U.S. Army Communications-Electronics Command, (ATTN: AMSEL-ME-IP) Fort Monmouth, NJ 07703-5000.

- l. Reference 122 may be requested from Commander, U.S. Army Natick Research, Development and Engineering Center, Natick, MA 0176-5014
- m. If in doubt about how to obtain a document, consult "How to Get It - A Guide to Defense-Related Information Resources," published by the Institute for Defense Analysis and available from DTIC under AD Number A110000.

APPENDIX B  
LIST OF ABBREVIATIONS AND ACRONYMS

APPENDIX B  
LIST OF ABBREVIATIONS AND ACRONYMS

A

AAE	Army Acquisition Executive
AMC	U.S. Army Materiel Command
AMSDL	Acquisition Management Systems and Data Requirements Control List
AOC	Area of Concentration
AR	Army Regulation
ARI	U.S. Army Research Institute
ARNG	Army National Guard
ARTEP	Army Training Evaluation Program
ASAP	Army Streamlined Acquisition Process
ASARC	Army Systems Acquisition Review Council
ASI	Additional Skill Indicator
ASVAB	Armed Services Vocational Aptitude Battery
ATM	Army Training Manual

B

BFV	Bradley Fighting Vehicle
BIT/BITE	Built-In-Test/Built-in-Test Equipment
BOIP	Basis of Issue Plan
BOIPFD	Basis of Issue Plan Feeder Data
BTA	Best Technical Approach

C

CBD	Commerce Business Daily
CDR	Critical Design Review
CDRL	Contract Data Requirements List (DD Form 1423)
CLU	Command and Launch Unit
CM/CCM	Counter Measure/Counter-counter measure
COEA	Cost and Operational Effectiveness Analysis
COR	Contracting Officer's Representative
CTEA	Cost and Training Effectiveness Analysis

D

DA	Department of the Army
DAC	Days after Contract Award
DCSOPS	Deputy Chief of Staff for Operations and Plans
DCSPER	Deputy Chief of Staff for Personnel
DID	Data Item Description



## D (Cont'd)

DoD	Department of Defense
DoDISS	Department of Defense Index of Specifications and Standards
DOF	Degree of Freedom
DTUPC	Design to Unit Production Cost
DUNS	Data Universal Numbering System

## E

ECA	Early Comparability Analysis
EOC	End of Contract
ET	Embedded Training

## G

GFE	Government-Furnished Equipment
-----	--------------------------------

## H

HARDMAN	Hardware versus Manpower
HEL	U.S. Army Human Engineering Laboratory
HEP	Human Engineering Program
HEPP	Human Engineering Program Plan
HFE	Human Factors Engineering
HFEA	Human Factors Engineering Assessment
HHA	Health Hazard Assessment
HMMWV	High Mobility Multipurpose Wheel Vehicle
HQ	Headquarters
HQDA	Headquarters, Department of the Army

## I

IAW	In accordance with
ICTP	Individual and Collective Training Plan (Obsolete term, see STRAP)
IEP	Independent Evaluation Plan
IER	Independent Evaluation Report
IET	Initial Entry Training
IFF	Identification, Friend or Foe
IFTE	Intermediate Forward Test Equipment
ILS	Integrated Logistics Support
IPR	In-process review
ISP	Integrated Support Plan
ITEP	Individual Training Evaluation Program
ITS	Integrated Training System
ITSP	Integrated Training System Plan

## J

JMSNS	Justification for Major System New Start (Obsolete term, see MNS)
JSOR	Joint Service Operational Requirement

## L

LAV	Light Armored Vehicle
LCCE	Life Cycle Cost Estimate
LCSMM	Life Cycle System Management Model
LRIP	Low Rate Initial Production
LRU	Line Replaceable Unit
LSA	Logistic Support Analysis
LSAR	Logistic Support Analysis Record

## M

MAC	Months After Contract Award
MACOM	Major Command
MANPRINT	Manpower and Personnel Integration
MARC	Manpower Requirement Criteria
MILES	Multiple Integrated Laser Engagement System
MIL-HDBK	Military Handbook
MILPERCEN	U.S. Army Military Personnel Center (Obsolete term, see PERSCOM)
MIL-STD	Military Standard
MJWG	MANPRINT Joint Working Group
MMMP	Manufacturer's MANPRINT Management Plan
MNS	Mission Need Statement
MOPP	Mission Oriented Protective Posture
MOS	Military Occupational Specialty
MOSC	Military Occupational Specialty Code
MPT	Manpower, Personnel, and Training
MPTS	Manpower, Personnel, Training and Safety
MRD	Materiel Requirements Documents
MSC	Major Subordinate Command
MSC	Medical Service Corps
MTOE	Modified Table of Organization and Equipment
MTTR	Mean Time To Repair

## N

NBC	Nuclear, Biological, Chemical
NDI	Nondevelopmental Item
NET	New Equipment Training
NETP	New Equipment Training Plan
NETT	New Equipment Training Team
NLT	Not Later Than
NTC	National Training Center

## N (Cont'd)

NTE Not To Exceed

## O

OA Operational Assessment  
O&O Plan Operational and Organizational Plan  
O&S Operation and Support  
ODCSOPS Office of Deputy Chief of Staff for Operations and Plans  
OJT On-The-Job Training  
ORF Operational Readiness Float  
OSD Office of the Secretary of Defense  
OT Operational Test(ing)  
OTEA U.S. Army Operational Test and Evaluation Agency  
OTSG Office of the Surgeon General of the Army

## P

PAM Pamphlet  
PDR Preliminary Design Review  
PE Procurement Executive  
PEO Program Executive Officer  
PERSCOM US Total Army Personnel Command  
PIP Product Improvement Proposal  
PM Program/Project/Product Manager  
PMO Program/Project/Product Management Office  
PM TRADE Project Manager for Training Devices  
POI Program of Instruction  
POL Petroleum, Oil, Lubricants  
PPBES Planning, Programming, Budgeting, and Execution System  
PPTP Personnel Performance and Training Program  
PSE Peculiar Support Equipment  
P<sup>3</sup>I Preplanned Product Improvement

## Q

QA Quality Assurance  
QE Quality Engineering  
QQPRI Qualitative and Quantitative Personnel Requirements Information

## R

R&D Research and Development  
RAM Reliability, Availability, and Maintainability  
RDTE Research, Development, Test, and Evaluation  
RFP Request For Proposal  
RGL Reading Grade Level

## R (Cont'd)

ROC	Required Operational Capability
RSI	Rationalization, Standardization, and Interoperability
RX	Repairable Exchange

## S

SAR	Safety Assessment Report
SAT	Systems Approach to Training
SC	Specialty Code
SEMP	System Engineering Management Plan
SMI	Soldier-Machine Interface
SMMP	System MANPRINT Management Plan
SOW	Statement of Work
SPM	Soldier Performance Measurement
SQI	Special Qualification Identifier
SQT	Skill Qualification Test
SS	System Safety
SSEB	Source Selection Evaluation Board
SSG	Special Study Group
SSI	Specialty Skill Identifier (Obsolete term, see AOC)
SSP	System Safety Program
SSWG	System Safety Working Group
STF	Special Task Force
STP	Soldier Training Package
STRAP	System Training Plan
STS	System Technical Support

## T

TAD	Target Audience Description
TB MED	Technical Bulletin, Medical
T&E	Test and Evaluation
TCR	Training Conference Review
TDA	Table of Distribution and Allowances
TDNS	Training Device Need Statement
TDS	Training Device System
TECOM	U.S. Army Test and Evaluation Command
TEMP	Test and Evaluation Master Plan
TILO	Technical Industrial Liaison Office
TMDE	Test, Measurement, and Diagnostic Equipment
TOA	Trade-Off Analysis
TOD	Trade-Off Determination
TOE	Table of Organization and Equipment
TQM	Total Quality Management
TRADOC	U.S. Army Training and Doctrine Command
TR	Technical Report

## T (Cont'd)

TSG	The Surgeon General of the Army
TT	Technical Testing
TWS	Thermal Weapon Sight

## U

USAHSC	U.S. Army Health Services Command
USAMRDC	U.S. Army Medical Research and Development Command
USAPIC	U.S. Army Personnel Integration Command
USASC	U.S. Army Safety Center
USAR	U.S. Army Reserve
USMC	U.S. Marine Corps

## W

WBS	Work Breakdown Structure
WRAIR	Walter Reed Army Institute of Research

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APPENDIX C  
AGENCIES WITH MAJOR  
MANPRINT RESPONSIBILITIES

## APPENDIX C

AGENCIES WITH MAJOR MANPRINT RESPONSIBILITIESADDRESSTELEPHONE

Deputy Chief of Staff for Personnel  
HQDA (DAPE-MR)  
Washington, DC 20310-0300

Autovon: 225-9213  
Commercial: (202) 695-9213

The Surgeon General  
HQDA (SGPS-PSP-E)  
5109 Leesburg Pike  
Falls Church, VA 22041-3258

Autovon: 289-0129  
Commercial: (703) 756-0129

U.S. Army Materiel Command  
5001 Eisenhower Avenue  
Alexandria, VA 22333-0001

Deputy Chief of Staff for Development,  
Engineering, and Acquisition (AMCDE-AQ)

Autovon: 284-9546  
Commercial: (703) 274-9546

U.S. Army Training and Doctrine Command  
FT Monroe, VA 23651-5000

Deputy Chief of Staff for Combat Develop-  
ments, Personnel Development Division,  
Combat Service Support Directorate

Autovon: 680-4225/4227  
Commercial: (804) 727-4225/4227

Deputy Chief of Staff for Training,  
System Training Directorate

Autovon: 680-3825  
Commercial: (804) 727-3835

U.S. Army Medical Research and Development Command  
ATTN: SGRD-PLC  
FT Detrick, Frederick MD 21701-5012

Autovon: 343-7301  
Commercial (301) 663-7301

U.S. Army Health Services Command  
Commander, Academy of Health Sciences  
ATTN: HSHA-CDM  
FT Sam Houston, TX 78234-6100

Autovon: 471-5775  
Commercial: (512) 221-5775

U.S. Army Operational Test and Evaluation Agency  
4501 Ford Avenue  
Alexandria, VA 22302-1458

Autovon: 289-2487  
Commercial: (202) 756-2487



# Agencias

## Appendix C

U.S. Total Army Personnel Command  
Hoffman II Building  
200 Stovall Street, Alexandria, VA 22332

Autovon: 221-8844  
Commercial: (703) 325-8844

U.S. Army Research Institute for the  
Behavioral and Social Sciences  
5001 Eisenhower Avenue  
Alexandria, VA 22333-5600

Autovon: 284-8917  
Commercial: (703) 274-8917

U.S. Army Safety Center  
ATTN: System Safety Officer  
FT Rucker, AL 36362-5363

Autovon: 558-6219  
Commercial: (205) 255-6219

U.S. Army Human Engineering Laboratory  
Aberdeen Proving Ground, MD 21005-5055

Autovon: 298-5830  
Commercial: (301) 278-5830

Project Manager for Training Devices  
12350 Research Parkway  
Orlando, FL 32826-3276

Autovon: 960-4315  
Commercial: (407) 380-4315

U.S. Army Personnel Integration Command  
ATTN: ATNC-NMF  
200 Stovall St.  
Alexandria, VA 22193-1345

Autovon: 221-0242  
Commercial (202) 325-0242

MANPRINT Joint Working Group (MJWG)  
(These Working Groups are located at  
Proponent Service Schools. Contact the  
MANPRINT point-of-contact at the appropriate  
TRADOC Proponent School listed below.)

Air Defense Artillery, FT Bliss, TX

Autovon: 978-1637  
Commercial: (915) 568-1637

Armor, FT Knox, KY

Autovon: 464-8132  
Commercial: (502) 624-8132

Aviation, FT Rucker, AL

Autovon: 558-4576  
Commercial: (205) 255-4576

Chaplin, FT Monmouth, NJ

Autovon: 992-2669  
Commercial: (201) 532-2669

Chemical, FT McClellan, AL

Autovon: 865-3483  
Commercial: (205) 238-3483

Appendix C

Agencies

Engineer, FT Leonard Wood, MO	Autovon: 676-7323 Commercial: (314) 563-7323
Field Artillery, FT Sill, OK	Autovon 639-2807 Commercial: (405) 351-2807
Infantry, FT Benning, GA	Autovon: 835-3914 Commercial (404) 545-3914
Soldier Support Center FT Benjamin Harrison, IN	Autovon: 699-3787 Commercial (317) 542-3787
* Intelligence Center FT Huachuca, AZ	Autovon: 879-3022 Commercial: (602) 538-3022
Military Police, FT McClellan, AL	Autovon: 865-3510 Commercial: (205) 238-3510
Ordnance Missile and Munitions Redstone Arsenal, AL	Autovon: 746-7408 Commercial: (205) 876-7408
Ordnance, Aberdeen Proving Ground, MD	Autovon: 298-4400 Commercial: (301) 278-4400
Quartermaster, FT Lee, VA	Autovon: 687-5466 Commercial: (804) 734-5466
Signal, FT Gordon, GA	Autovon: 780-7107 Commercial: (404) 791-7107
Transportation and Aviation Logistics FT Eustis, VA	Autovon: 927-6063 Commercial: (804) 878-6063

**FOR TRAINING PURPOSES ONLY****APPENDIX D****MANPRINT RELEVANT DRAFT  
DATA ITEM DESCRIPTIONS****NOTICE TO READERS**

The draft Data Item Descriptions comprising Appendix D are not approved at this time. Although preliminary consideration is being given to seeking approval of MANPRINT DIDs, especially in the manpower and personnel domains, there is no certainty that that will happen. Therefore, the reader is cautioned against reproducing the draft DIDs in this appendix for use in actual RFPs. The draft DIDs are presented because some MANPRINT data requirements are not served by existing approved DIDs and the content of these drafts illustrates one possible structure for requesting the needed data. If they prove useful, then the reader should extract the essential information and insert that information in the appropriate parts of the SOW of the RFP being prepared.

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DATA ITEM DESCRIPTION		Form Approved LMB No 0704-0188 Exp Date Jan 30, 1986	
1. TITLE Manufacturer's MANPRINT Management Plan		2. IDENTIFICATION NUMBER DI-XXXX-0000X	
3. DESCRIPTION/PURPOSE The Manufacturer's MANPRINT Management Plan (MMMP) describes the contractor's MANPRINT program, identifies its elements and explains how the elements will be managed. This document is used by the procuring activity as the principal basis for approval of the contractor's program and as one (Continued on Page 2)			
4. APPROVAL DATE (YYYYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY (OPR)	6a. DTIC REQUIRED	6b. GIDEP REQUIRED
7. APPLICATION/INTERRELATIONSHIP 7.1 This data item description contains the format and content preparation instructions for the data product generated by the specific and discrete task requirement for this data included in the contract. 7.2 The Manufacturer's MANPRINT Management Plan is related to DI-HFAC-80740, Human Engineering Program Plan; DI-H-7066, Training and Training Equipment Plan; DI-XXXX-000XX, (Continued on Page 2)			
8. APPROVAL LIMITATION		9a. APPLICABLE FORMS MIL-H-46855B MIL-STD-1472	9b. AMSC NUMBER
10. PREPARATION INSTRUCTIONS 10.1 <u>Reference Documents.</u> The applicable issue of the documents cited herein, including their approval dates and dates of any applicable amendments, notices, and revisions, shall be as specified in the contract. 10.2 <u>Contract.</u> This data item is generated by the contract which contains a specific and discrete work task to develop this data product. 10.3 <u>Format and Content Requirements.</u> The format shall be contractor selected and shall consist of the following: 10.3.1 <u>Table of Contents, List of Illustrations and Introduction.</u> 10.3.2 <u>Organization.</u> This section shall identify and describe the contractor's primary organizational element responsible for complying with MANPRINT requirements. The functions and internal structure of this element shall be defined. Structural definition shall include the number of proposed personnel on an annual basis and summary job descriptions for each person. In addition, the relationships of this element to other organizational elements responsible for areas impacted by MANPRINT, such as those charged with equipment and software design, test and evaluation, integrated logistic support and other engineering specialty programs (such as reliability, maintainability, survivability vulnerability, and transportability) shall be fully explained. The authority delegated to each of the elements shall be stated in explaining the relationships. This section shall also describe the contractors' approach to integrating each of the MANPRINT domains (Manpower, Personnel, Training, Human Factors Engineering, System Safety and Health Hazard Assessment) into (Continued on Page 2)			

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DI-XXXX-0000X

**3. DESCRIPTION/PURPOSE** *(Continued)*

basis for review of the contractor's progress.

**7. APPLICATION/INTERRELATIONSHIP** *(Continued)*

7.2 Manpower and Personnel Program Plan; DI-SAFT-801000, System Safety Program Plan; and DI-SAFT-80106, Health Hazards Assessment.

**10. PREPARATION INSTRUCTIONS** *(Continued)*

10.3.2 system design and testing.

10.3.4 MANPRINT in System Analysis. This section shall identify those MANPRINT efforts in system analysis (or, where contractually required, in system engineering), which are contractually applicable and the organizational element(s) responsible for their performance. Manprint participation in system mission analysis, determination of system functional requirements and capabilities, allocation of system functional requirements to human/hardware/software, determination of aptitude requirements for operators and maintainers, development of system functional flows and performance of system effectiveness studies shall be fully described. Any data required from the procuring activity shall be described.

10.3.5 MANPRINT in Equipment Detail Design. This section shall describe the effort in equipment detail design to ensure compliance with requirements specified by the contract. MANPRINT participation in studies, tests, computer aided design (CAD) evaluations, mock-up evaluations, dynamic simulation, detail drawing reviews, systems design reviews and system/equipment/component design and performance specification preparation and reviews shall be fully described.

10.3.6 MANPRINT in Test and Evaluation. This section shall describe MANPRINT test and evaluation as an integrated effort within the contractor's total test and evaluation program and shall contain specific information to show how and when the contractor shall satisfy test and evaluation requirements of the contract. Design milestones shall be identified at which MANPRINT tests are to be performed to assess compatibility among human performance requirements, personnel aptitude requirements, training and skill requirements, equipment design aspects of personnel equipment/software interfaces, system safety, and elimination and/or control of health hazards. Major test and demonstration objectives shall be identified and proposed test methods shall be described. This section shall also identify the MANPRINT personnel involved in test and evaluation, and summarize the MANPRINT test schedule. The summary test schedule shall depict major MANPRINT evaluations and demonstrations in relationship to major project milestones such as 90 percent design release, project level design reviews, first article demonstration tests and commencement of procuring activity testing.

10.3.7 MANPRINT Deliverable Data Products This section shall identify and briefly describe each MANPRINT deliverable data product specified in the contract.

10.3.8 Time-Phase Schedule and Level of Effort. This section consists of a milestone chart which identifies efforts to be accomplished in each of the six separate MANPRINT domains and a cross-index relating the efforts in each domain to contract requirement.

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DI-XXXX-0000X

10.3.9 Related Plans. This section shall identify and describe related plans for the six separate MANPRINT domains (Manpower, Personnel, Training, Human Factors Engineering, System Safety, and Health Hazard Assessment). The Human Engineering Program Plan (DI-HFAC-80740), the Training and Training Equipment Plan (DI-H-7066) the Manpower and Personnel Program Plan (DI-XXXX-000XX) and the System Safety Program Plan (DI-SAFT-80100) may be included in the MMMP by reference.

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DATA ITEM DESCRIPTION			Form Approved OMB No 0704-0188	
1. TITLE Manpower and Personnel Program Plan			2. IDENTIFICATION NUMBER DI-XXXX-000XX	
3. DESCRIPTION/PURPOSE 3.1 This Manpower and Personnel Program (MAPP) Plan is the document which describes the contractor's program to address manpower and personnel issues and their impact on equipment design. This document is the contractor's description of manpower and personnel analyses, tests and evaluations to <i>(Continued on Page 2)</i>				
4. APPROVAL DATE (YYYYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY (OPR)		6a. DTIC REQUIRED	6b. GIDEP REQUIRED
7. APPLICATION/INTERRELATIONSHIP 7.1 The Manpower and Personnel Program (MAPP) Plan is related to DI-XXXX-0000X Manufacturer's MANPRINT Management Plan. 7.2 This DID contains the format and content preparation instructions for the plan described by x.x.x of MIL-STD-xxx. <i>(Continued on Page 2)</i>				
8. APPROVAL LIMITATION		9a. APPLICABLE FORMS		9b. AMSC NUMBER
10. PREPARATION INSTRUCTIONS 10.1 <u>Reference Documents.</u> The applicable issue of the documents cited herein, including their approval dates and dates of any applicable amendments, notices, and revisions, shall be as specified in the contract. 10.2 <u>General.</u> The MAPP shall describe in the contractor's format an integrated effort within the total project to show how and when the contractor will perform the manpower and personnel program requirements specified in the contract. The MAPP Plan shall include: a. A description of the plans, analyses, tests and evaluations by which the system manpower and personnel issues are to be addressed. b. The contractor's understanding and commitment to recommend system design changes to meet the government provided manpower and personnel constraints. c. The procedures for integrating the MAPP requirements with the training and Human Factors Engineering plans and activities. d. The manner to preclude duplication of data or efforts with programs such as Logistics Support Analysis (LSA) and Integrated Logistic Support (ILS). <i>(Continued on Page 2)</i>				
DISTRIBUTION STATEMENT Approved for public release; distribution is unlimited				

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DI-XXXX-000XX

### 3. DESCRIPTION/PURPOSE (*Continued*)

optimize human-machine interface. The procuring activity will use this document to approve the contractor's program and to review the contractor's progress.

### 7 APPLICATION/INTERRELATIONSHIP (*Continued*)

7.3 It is not intended that all of the requirements contained herein should be applied to every program or program phase. Portions of this DID are subject to deletion tailoring depending upon the program phase in which it is applied in the contract.

### 10. PREPARATION INSTRUCTIONS (*Continued*)

10.2.2 Organization. This section shall identify and describe the contractor's primary organizational element responsible for complying with Manpower and Personnel requirements. The functions and internal structure of this element shall be defined. Structural definition shall include the number of proposed personnel on an annual basis and summary job descriptions for each person. In addition, the relationships of this element to other organizational elements responsible for areas impacted by equipment and software design, test and evaluation, integrated logistic support and other engineering specialty programs (such as reliability, maintainability, survivability/vulnerability, and transportability) shall be fully explained. The authority delegated to each of the elements shall be stated in explaining the relationships. This section shall also describe the methods by which the contractor shall ensure that compatibility is continuously maintained between the design of system hardware and software (including support and training equipment), human performance requirements, health hazard limitations, and manpower and personnel requirements.

10.2.3 Subcontractor Efforts. If any work related to system components or software having manpower or personnel implications is to be performed under subcontract, the subcontractor's organizational element responsible for manpower and personnel shall be described to the same extent as the prime contractor's organization is covered.

10.2.4 Plan Consolidation. This Manpower and Personnel Program Plan may be prepared as a separate plan or be a section of a Manufacturer's MANPRINT Management Plan (MMMP), if the MMMP is a contract requirement. DID DI-XXXX-0000X, Manufacturer's MANPRINT Management Plan.

10.2.5 Manpower and Personnel Issues. Discuss the manpower and personnel issues associated with the system components and the kinds of analyses planned to determine the manpower and personnel impacts on operational, maintenance and support functions for each design approach.

10.2.6 Approach to Tasks. Describe the allocation of functions and inventory of tasks that people must perform for each design approach.

10.2.7 Performance Requirements. Describe the analysis to show performance requirements bounded by minimum acceptable accuracy and maximum acceptable time for operator, maintainer and support personnel. Identify the method by which critical tasks will be evaluated.

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DI-XXXX-060XX

10.2.8 Design Trade-off Analysis. Describe the analyses that identify alternative design concepts that maximize task and system performance levels while remaining within the manpower and personnel constraints provided by the procuring activity. State how each design approach will receive a human performance capability analysis.

10.2.9 Optimum Design. Describe the procedures proposed to test and evaluate the sensitivity analyses relating design alternatives and effectiveness with varying manpower and personnel factors.

10.3 Time-Phase Schedule and Level of Effort. Provide a milestone chart which identifies each separate manpower and personnel analysis, test and evaluation. State the man-month level of effort for each task.

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(FROM REFERENCE 117)

DATA ITEM DESCRIPTION		Form Approved OMB No. 0704-0133 Exp. Date: Jan 30, 1986	
1. TITLE <b>TASK ANALYSIS REPORT</b>		2. IDENTIFICATION NUMBER <b>DI-XXXX-00XXX</b>	
3. DESCRIPTION/PURPOSE  3.1 The analysis of human tasks involved in the operation or maintenance of the equipment under development provides one of the bases for making decisions in the areas of human engineering, training logistics, test and evaluation, manning, and workload. This Data Item Description (DID) identifies the <i>(Continued on Page 2)</i>			
4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY (OPR)	6a. DTIC REQUIRED	6b. GDEP REQUIRED
7. APPLICATION/INTERRELATIONSHIP  7.1 This Data Item Description (DID) contains the format and content preparation instructions for task analysis data generated under the work tasks described in DRAFT MIL-STD-XXXX, Task Analysis Standard.  7.2 This DID is applicable to the acquisition of military systems, equipment, and facilities. <i>(Continued on Page 2)</i>			
8. APPROVAL LIMITATION		9a. APPLICABLE FORMS	9b. AMSC NUMBER
10. PREPARATION INSTRUCTIONS  10.1 <u>Source document.</u> The applicable issue of the documents cited herein, including their approval dates and dates of any applicable amendments, notices, and revisions, shall be as reflected in the contract.  10.2 <u>Guidance.</u> The Task Analysis Report (TAR) shall be based on the Task Analysis Standard, DRAFT MIL-STD-XXXX. Methods appropriate to the development of the Task Analysis Report are described in DRAFT MIL-HDBK-XXXX.  10.3 <u>Content.</u> The Task Analysis Report shall contain the following information items, either numbered or arranged (e.g., by outline or diagram) to show their relationship to each other:  A. Input Parameters  Information Required Information Available Initiating Cues Data Display Format  B. Central Processing Parameters  Decisions or Evaluation Processes Decisions Reached After Evaluation Job Knowledge Required <i>(Continued on Page 2)</i>			

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DI-XXXX-00XXX

**3. DESCRIPTION/PURPOSE** (*Continued*)

Government content and format requirements to prepare a report of task analysis data.

**7. APPLICATION/INTERRELATIONSHIP** (*Continued*)

7.3 This report describes the results of a task analysis performed by the contractor, which provides a database to support efforts in the areas of human engineering, training, logistics, test and evaluation, manning, and workload.

**10. PREPARATION INSTRUCTIONS** (*Continued*)

System Knowledge Required  
Academic Knowledge Required  
Significant Memorization Requirements

**C. Response Parameters**

Actions Taken  
Body Movements Required by Action Taken  
Workspace Envelope Required by Actions Taken  
Workspace Envelope Available for Actions Taken  
Physical Skills Required  
Frequency or Interval of Actions  
Tolerances of Actions  
Tools, Job Aids Used  
Support and Test Equipment  
Power Requirements  
Spares or Parts  
Adequacy of Space Support  
Controls Used  
Control Location  
Instrumentation, Displays, Signals Used  
Instrumentation, Display, Signal Location

**D. Feedback Parameters**

Feedback Required  
Feedback Available  
Cues Indicating Task Completion  
Rate of Feedback Update  
Format of Feedback

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DI-XXXX-00XXX

**E. Environmental Parameters**

- Workspace Available
- Workspace Envelope Required
- Workplace Arrangement
- Environment Contamination Level
- Climate
- Noise
- Shock, Vibration, Motion
- Lighting
- Workspace Accessibility
- Workplace Accessibility
- Life Support and Protective Gear

**F. Safety Parameters**

- Types and Locations of Safety Hazards
- Cause of Safety Hazard
- Frequency of Safety Hazard
- Consequences of Safety Hazard
- Safety Procedures
- Recommendation to Eliminate or Minimize Safety Hazard

**G. Health Parameters****1. Mechanical Forces**

- Impulse Noise and Blast Overpressure
- Steady State Noise
- Ultrasound
- Vibration and Motion
- Acceleration and Deceleration
- Impact, Shock and Recoil
- Windblast
- Pressure Fluctuations
- Weight and Force Loadings

**2. Temperature Extremes**

- Ambient and Radiant Heat
- Surface Heat
- Flame and Fire
- Ambient Cold
- Surface Cold

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DI-XXXX-00XXX

**3. Electromagnetic Radiation**

- Laser Radiation
- Microwave and RF Radiation
- Ultraviolet Radiation
- Intense Visible Light
- Ionizing Radiation
- Particle Beams
- Magnetic Fields

**4. Toxic Substances**

- Fumes, Vapors and Aerosols
- Smoke
- Liquids
- Solids
- Dust and Particulates
- Chemical Warfare Agents, Biological Warfare Agents, and Antidotes

**5. Psychological Stress**

- Confined Spaces
- Isolation
- Sensory and Cognitive Overload
- Visual Illusions and Disturbances
- Bodily Disorientation (Vestibular and Kinesthetic)
- Sustained High-Intensity Operations

**6. Other**

- Caustic Chemicals
- Oxygen Deficiencies (Airborne and Terrestrial)
- Restricted Nutrition
- Restricted Water Availability
- Excessive Water, Moisture or Humidity
- Human Waste Elimination Constraints
- Pests (Insects and Rodents)
- Broken Glass, Shrapnel and Missiles
- Skin or Eye Contact
- Electric Shock
- Bacteria, Viruses and Fungi

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DI-XXXX-00XXX

**H. Performance Standards and Workload Parameters**

Accuracy Requirements  
Consequences of Errors  
Subjective Assessment by Operator, Maintainer, or Support Personnel of the Reasons for Their Errors  
Description of Each Possible Human-initiated Error(s)  
Performance Under Stress  
Subjective Assessment of Task Workload  
Subjective Assessment of Equipment Design Adequacy for Task Performance  
Subjective Assessment of Sufficiency of Training and Experience for Task Performance  
Physiological Assessment of Workload  
Cognitive Workload Assessment  
Criteria for Successful Performance  
Error Sources  
Allocated Elapsed Time or Time Budget  
Allocated Man-hours  
Predicted Elapsed Time  
Predicted Man-hours  
Task Schedule or Time Line  
Elapsed Time Required to Accomplish the Task

**I. Social and Organizational Parameters**

Task Interdependence of Crewmembers  
Number of Personnel Required to Perform Task  
Specialty and Experience Requirements  
Division of Labor or Responsibility  
Communications Employed

**J. Housekeeping Parameters**

Task, Subtask, Task Element Title or Statement  
Task, Subtask, Task Element Number  
Methodology Used to Generate Task Analysis Results  
Data Sources Used  
Date  
Name of Task Analyst  
System Mission, Function  
Position Title, Duty (of position being analyzed)  
Position or Skill Specialty Code (MOS)  
Activities Preceding the Task  
Concurrent Tasks  
Additional Comments  
Validation and Quality Control (Especially of Critical Tasks)

**K. Other Parameters (not listed above)****FOR TRAINING PURPOSES ONLY**

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10.4 Format. The task Analysis Report shall incorporate graphic formats, textual formats, or both. Each class of format is described below.

10.4.1 Graphic format. Graphics shall be used primarily to pictorially represent the sequential, parallel, or interactive relationships of human task and equipment components.

10.4.2 Textual format. Text shall be used to show a level of detail that cannot be encompassed in the graphics and to describe tasks or task parameters that are not easily represented by graphical means. Narrative formats shall be taken to include lists, outlines, and forms.

10.4.3 Graphic/Textual Format. Task Analysis data that are presented in both graphic and textual formats shall be alphanumerically coded to clearly indicate the redundancy or relationship between graphic and textual formats.

10.5 Traceability. The Task Analysis Report shall include the names of individuals involved in the development and validation of the task analysis data.

10.6 Access. All data and documentation shall be maintained at the contractor's facilities and made available to the procuring activity for meetings, audits, demonstrations, test and evaluation, and related functions. The completed task analysis database and report become the property of the Government at the end of the task analysis effort.

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(FROM REFERENCE 117)

DATA ITEM DESCRIPTION		Form Approved OMB No. 0704-0188 Exp. Date: Jan 30, 1986									
1. TITLE  TASK INVENTORY REPORT		2. IDENTIFICATION NUMBER  DI-XXXX-0XXXX									
3. DESCRIPTION/PURPOSE  3.1 A task inventory is a comprehensive listing of all human tasks associated with a system, equipment, or facility. A task inventory succinctly describes all tasks that might be further analyzed and so drives any subsequent tasks analysis effort. It also allows for efficient organization of tasks into (Continued on Page 2)											
4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY (OPR)	6. DTIC REQUIRED	6a. GDEP REQUIRED								
7. APPLICATION/INTERRELATIONSHIP  7.1 This Data Item Description (DID) contains the format and content preparation instructions for the task inventory data generated under the work tasks described in DRAFT MIL-STD-XXXX, Task Analysis Standard.  7.2 This DID is applicable to the acquisition of military systems, equipment, (Continued on Page 2)											
8. APPROVAL LIMITATION		9a. APPLICABLE FORMS	9b. AMSC NUMBER								
10. PREPARATION INSTRUCTIONS  10.1 <u>Source document.</u> The applicable issue of the documents cited herein, including their approval dates and dates of any applicable amendments, notices, and revisions, shall be as reflected in the contract.  10.2 <u>Guidance.</u> The Task Inventory Report (TIR) shall be based on the Task Analysis Standard, DRAFT MIL-STD-XXXX. Methods appropriate to the development of a Task Inventory are described in DRAFT MIL-HDBK-XXXX.  10.3 <u>Contents.</u> The Task Inventory Report shall contain the following information items, either numbered or arranged (e.g., by outline or diagram) to show their relationship to each other:  <table border="0"> <tr> <td>1. Mission</td> <td>5. Duties</td> </tr> <tr> <td>2. Scenarios/conditions</td> <td>6. Tasks</td> </tr> <tr> <td>3. Requirements</td> <td>7. Subtasks</td> </tr> <tr> <td>4. Jobs</td> <td>8. Task elements</td> </tr> </table> 10.4 <u>Format.</u> The Task Inventory Report shall incorporate both graphic and textual formats. Each of these formats is described below.  10.4.1 A diagram representing the hierarchical relationships among data items shall be prepared. The procuring activity will provide the data for Mission and Scenarios/conditions, and the contractor shall provide all other required data items.  10.4.2 All tasks, subtasks, and task elements shall be textually represented as task (Continued on Page 2)				1. Mission	5. Duties	2. Scenarios/conditions	6. Tasks	3. Requirements	7. Subtasks	4. Jobs	8. Task elements
1. Mission	5. Duties										
2. Scenarios/conditions	6. Tasks										
3. Requirements	7. Subtasks										
4. Jobs	8. Task elements										

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### 3. DESCRIPTION/PURPOSE (*Continued*)

jobs and duties. This Data Item Description (DID) identifies the Government content and format requirements to prepare a report of task inventory data.

### 7. APPLICATION/INTERRELATIONSHIP (*Continued*)

7.2 and facilities.

7.3 The Task Inventory Report (TIR) will be used as the starting point for the Critical Task Analysis Report (CTAR), DI-H-XXXX, and the Task Analysis Report (TAR), XXXX-00XXX.

7.4 This DID applies to the requirements of DRAFT MIL-STD-XXXX pertaining to the preparation of a task inventory.

### 10. PREPARATION INSTRUCTIONS (*Continued*)

10.4.2 statements. Task statements shall be composed of:

- a. an action verb that states what is to be accomplished in the task,
- b. an object that identifies what is to be acted upon in the task, and
- c. any qualifying phrases needed to distinguish the task from related or similar activities, limit and define the scope of the task, and clearly communicate the nature of the task.

10.4.3 Hierarchically related task inventory data shall be numbered accordingly.

10.5 traceability The Task Inventory Report shall include the names of individuals involved in the development and validation of the task inventory.

10.6 Access In accordance with MIL-H-46855, all data and documentation shall be maintained at the contractors facilities and made available to the procuring activity for meetings, audits, demonstrations, test and evaluation, and related functions. The completed task inventory database and report become the property of the Government at the end of the task analysis effort.

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DATA ITEM DESCRIPTION			Form Approved OMB No. 0704-0188	
1. TITLE Task Performance Capability Analysis Report		2. IDENTIFICATION NUMBER DI-XXXX-XXXXX		
3. DESCRIPTION/PURPOSE 3.1 This report provides the results of the Task Performance Capability Analyses (TPCA) that compared equipment design changes with the distribution of personnel task performance for various manpower levels.				
4. APPROVAL DATE (YYYYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY (OPR)	6a. DTIC REQUIRED	6b. GIDEP REQUIRED	
7. APPLICATION/INTERRELATIONSHIP 7.1 This DID contains the format and content preparation instructions to satisfy the data requirements generated under the work task described in MIL-STD-xxxx. 7.2 It is not intended that all the requirements contained herein should be applied to every program or program phase. Portions of this DID are subject to deletion tailoring depending upon the (Continued on Page 2)				
8. APPROVAL LIMITATION		9a. APPLICABLE FORMS		9b. AMSC NUMBER
10. PREPARATION INSTRUCTIONS 10.1 <u>Reference Documents.</u> The applicable issue of the documents cited herein, including their approval dates and dates of any applicable amendments, notices, and revisions, shall be as specified in the contract. 10.2 <u>Report Format.</u> The Task Performance Capability Analysis Report shall be in the contractor's format. 10.3 <u>Report Contents.</u> 10.3.1 <u>Task Performance Distribution.</u> Estimates of the distribution of personnel task performance shall be provided for each equipment design. For each potential and alternative design approach listed, identify significant manpower and personnel characteristics applicable to each. The personnel task performance capability allocation for each equipment design will be compared against the system's manpower and personnel constraints as provided by the procuring activity. Show the impact in manpower quantities and personnel quality by aptitude area scores for each equipment design using unconstrained manpower or personnel resources. 10.3.2 <u>System Performance Comparisons.</u> A comparison table to depict the identified knowledges and skills required to operate and maintain each design approach shall be made to portray design task performance differences. The table will allow rapid comparison and evaluation of potential (Continued on Page 2)				
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### 7. APPLICATION/INTERRELATIONSHIP (*Continued*)

7.2 program phase in which it is applied in the solicitation contract.

7.3 The Task Performance Capability Analysis Report is related to DI-HFAC-80745, Human Engineering System Analysis Report; DRAFT DI-XXXX-0XXXXX (Task Inventory Report); Draft DI-XXXX-00XXX (Task Analysis Report); and DI-H-7055, Critical Task Analysis Report.

### 10. PREPARATION INSTRUCTIONS (*Continued*)

10.3.2 design approaches. Each design approach will have listed any risks or assumptions which may impact the manpower and personnel task performance capabilities not yet confirmed.

10.3.3 Preferred Constrained Design Concept Select the preferred design based on the most equitable and efficient distribution of task performance. Provide the results in both tabular and narrative form. Justify the selection by presenting the manpower and personnel constraints, system performance requirements, knowledge and skill prerequisites and any other backup data deemed necessary to support the selection.

10.3.4 Preferred Unconstrained Design concept When a preferred design alternative exceeds preestablished manpower or personnel constraints, identify all advantages of the design selection that outweigh the constraint restrictions. Show whether performance objectives can actually be met or not within the manpower and personnel constraints. Describe how system effectiveness and performance can be increased by exceeding the manpower or personnel constraints. Determine the quantitative manpower increases for each system and all systems. Describe tasks, skills, knowledges and physical strengths that are not currently required of operators and maintainers in the MOS(s) designated for the system. The content, level of detail and format of these descriptions shall be suitable for inclusion in the 611 series of Army regulations on personnel classification.

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DATA ITEM DESCRIPTION		Form Approved OMB No 0704-0158	
1. TITLE Qualitative and Quantitative Personnel Requirements Information (QQPRI) and Training Requirements Report		2. IDENTIFICATION NUMBER DI-XXXXX0-0000X	
3. DESCRIPTION/PURPOSE 3.1 QQPRI is used as a source of data for the development or revision of personnel concepts or policies, the identification of operator, maintainer and support personnel requirements by numbers, skills and other qualifications and planning the conduct of necessary training programs in operations and maintenance.			
4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY (OPR)	6a. DTIC REQUIRED	6b. GIDEP REQUIRED
7. APPLICATION/INTERRELATIONSHIP 7.1 This DID contains the format and content preparation instructions to satisfy the data requirements generated under the work task described in MIL-STD-xxxx. 7.2 It is not intended that all the requirements contained herein should be applied to every program or program phase. Portions of this DID are subject to deletion tailoring depending upon the ( <i>Continued on Page 2</i> )			
8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER	
10. PREPARATION INSTRUCTIONS 10.1 <u>Reference Documents</u> . The applicable issue of the documents cited herein, including their approval dates and dates of any applicable amendments, notices, and revisions, shall be as specified in the contract. 10.2 <u>Report Format</u> . The QQPRI and Training Requirements Report shall be in the contractor's format. 10.3 <u>Report Contents</u> . 10.3.1 <u>System Description</u> . The information and description of the system that are pertinent to the QQPRI shall be extracted, to the extent possible, from the system analyses or system specifications and include the following items. a. military purpose and operational characteristics b. maintenance and operational concepts, plans, and assumptions c. new equipment. 10.3.2 <u>Maintenance and Operations Summary</u> . This section shall include time based mission segments, function flow diagrams, line drawings, photographs, or other pictorial representations to illustrate job operations, locations, position interactions, and sequential work flow within and ( <i>Continued on Page 2</i> )			
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### 7. APPLICATION/INTERRELATIONSHIP (*Continued*)

- 7.2 program phase in which it is applied in the solicitation contract.
- 7.3 The QQPRI is related to DI-H-7066, Training and Training Equipment Plan.
- 7.4 The DID supersedes DI-H-1300 and DI-H-3253/Q-103-2.

### 10. PREPARATION INSTRUCTIONS (*Continued*)

10.3.2 between organizational, operations, and support activities. Such illustrations shall be used to support narrative descriptions, which shall include numbered paragraphs listed as below.

- a. Summary of job operations
- b. Identification of personnel
- c. Team performance
- d. Time

10.3.3 Position Description. The basic data for position descriptions include duties and tasks selectively combined from the many actions demanded for the operation, maintenance, and control of the system. The position descriptions will include the following:

- a. A listing of duty positions required to operate, maintain and support the equipment.
- b. Descriptions of these positions and suggested placement and job title within the procuring activities military career fields, specialties, ratings or skill areas. Revised or new career fields will be reported, described and thoroughly justified.

10.3.4 Manning Data. This section shall include the following:

- a. Numerical requirements in both chart and narrative form showing estimates of manpower required to operate and to perform maintenance tasks at all levels of maintenance and the differences in requirements compared to any preestablished manpower or personnel constraints. Manpower estimates will consider all predictable factors affecting personnel performance to include environment, task proficiency level, relationship of positions as teams, crews, or independent, and manning factors of 8 hours, 12 hours, 24 hours for periodic, continuous and strenuous position demands. The positions will be described by organizational, and functional diagrams showing the exact location of all positions.
- b. The grade and skill levels of all military (Active and Reserve component) and comparable civilian and contract personnel required to operate, maintain and support the system.
- c. Special skills, knowledges, abilities, physical or mental qualifications required to perform operator or maintenance tasks. Primary effort should be directed toward identification of new and unique skills.

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**10. PREPARATION INSTRUCTIONS (Continued)**

- d. Information will be derived from task analysis and from Maintenance Engineering Analysis (MEA) and its supporting data items when it is applied to the contract. Otherwise, this report will be developed from system engineering or other available data.

10.3.5 Special Problem Areas. Include in this section any unusual personnel requirement problems inherent in the proposed maintenance and operational employment of the system that have not been previously described in this report or that require further attention. The following will apply:

- a. Special emphasis will be placed on hazards associated with system operation and maintenance.
- b. The nature of the problems encountered will be described and possible alternative solutions will be suggested.
- c. The nature of the solutions will be oriented toward the aptitude of individuals required or to the special training needed to enable personnel to cope with these problems.
- d. If solutions cannot be made through simple training procedures, the contractor will suggest equipment or control modifications that could alleviate the problems.

**10.3.6 New Equipment Training (NET) Requirements Report.**

- a. Military, civilian or contract personnel instructor requirements for institutional and unit training shall be described in narrative and chart form.
- b. Operator and maintenance training requirements will be reported by the contractor in narrative format and will contain details for conduct of the following:
  - (1) Staff Planner courses
  - (2) Technical training courses for key instructor, key depot and other key personnel as required
  - (3) New Materiel Introduction (NMI)
  - (4) New Equipment Training Teams (NETT)
- c. Details shall include as appropriate:
  - (1) Course title
  - (2) Course length
  - (3) Functional area (Maintenance or Operations)
  - (4) Entrance requirements

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- (5) Course output stated in terms of an existing career field or appropriate position definition
- (6) Subject outline of proposed program of instruction
- (7) Class size (number of students per class session and practical exercise session)
- (8) Equipment required
- (9) Training devices and aids
- (10) Training equipment
- (11) Facilities/services

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